

THE UNIVERSITY OF MANITOBA

A REVIEW OF EXPERIMENTAL WORK BEING CARRIED ON
IN THE USE OF TELEVISION AS AN AID TO CLASSROOM
INSTRUCTION BELOW COLLEGE LEVEL.

BEING A THESIS SUBMITTED TO THE COMMITTEE
ON POST-GRADUATE STUDIES IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF
EDUCATION

BY

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WINNIPEG, MANITOBA

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AN ABSTRACT

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The purpose of the study is to present a comprehensive review of the major experiments being carried on in the use of television in schools below college level.

In selecting studies for review, a first consideration was to select those which would bring out any fundamental differences that might exist in underlying philosophy. For example, experimentation carried out in Canada, France, and England is based on the premise that the prime purpose of television instruction is to enrich and enliven conventional teaching. In sharp contrast to this, much of the experimentation in the United States has been designed principally to test the feasibility of using television for the formal teaching of basic course material.

A second consideration was to choose studies that would bring under consideration a wide variety of possible approaches to the problem of how best to utilize television in classroom instruction. The particular significance of each of the studies selected for review may be briefly outlined as follows:

The Pittsburgh Experiment is a study in the use of television as an instrument of formal teaching of elementary grade work in which the television teaching was re-enforced with a limited amount of supplementary teaching.

The St. Louis Experiment is unique in that it represents the first and only attempt to teach large groups of students over a lengthy period of time by television without the aid of supplementary instruction. It offers a further contrast to The Pittsburgh Experiment in that the teaching was carried on with large groups (up to 150 in number) and was directed to Junior High School grades.

The Nebraska Experiment was one in which a University, through its extension service, gave assistance to rural high schools through the medium of open-circuit television-correspondence courses.

The Hagerstown Experiment offers a good example of a comprehensive attempt to teach all grades from I through XII in groups of varying sizes by closed circuit television under the direction of a "teaching team" made up of studio and classroom teachers working closely together. Two interesting features of this experiment were the summer workshops for training teachers in the effective use of television, and the utilization of television at the Junior High School level in such a way as to effect a reduction of over 16% in teaching staff.

Features of experimentation in France are the high quality of production, the extent to which teachers have been involved in the preparation and carrying out of programs, and the enthusiasm with which educational television

has generally been received. Worthy of special notice are the vocational television courses which are being presented in a deliberate attempt to lead young people into new fields vital to the development of modern France.

Canadian experimentation, unlike that in the United States, was first begun at the national level. In 1956 the National Broadcasting Council in its report suggested that the time was now ripe for further experimentation within the provinces. Manitoba became the first province to implement the recommendation with a series of televised lessons presented in 1958. Of particular importance in Canada were the attempts to determine the relative suitability of various subjects for television presentation, and to test the relative effectiveness of various methods of presentation of subject matter.

The review brings out the fact that the progress of educational television in England has been slow, as witnessed by the fact that a full fledged national program in that country is only two years old. Notable characteristics of the English approach are the emphasis placed on limited offerings of high quality, the belief based on experience to date that television as a teaching aid holds the greatest promise in the teaching of Science, and the firm conviction that the usefulness of television in classroom instruction is limited to that of a teaching aid for the classroom teacher.

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CHAPTER I

INTRODUCTION

Purpose of the Study

The purpose of the study was to present a comprehensive review of the experimental work being carried on in the use of television in schools below college level.

According to Dr. T. C. Pollock of New York University, "television offers the greatest opportunity for the advancement of education since the introduction of printing by movable type." (1, p. 27) The opposite view is well expressed by Dale who says:

"The teacher on the television screen can never enjoy the rapport with his students that makes the difference between a one-sided performance and a true interaction of minds. He cannot tell whether he is stimulating his classes, confusing them, or sending them into a torpor. And, what is worse, his students can ask no questions." (2, p. 202)

Perhaps most people today stand on intermediate ground, not quite sure as to what the true function of television may be, yet feeling certain that anything that has been able to evoke such tremendous interest on the part of old and young alike could undoubtedly be a potent instrument for education if its power could be harnessed to that end.

Examples of interest are not far to seek. A survey of a junior high school in Stamford, Connecticut, revealed that students were spending twenty-seven hours a week at their television sets - only thirty-five minutes less than they were spending in class. (3, p. 425) A similar survey conducted at Xavier University reached the startling

conclusion that twelve and thirteen year olds were watching television for an average of thirty hours a week as compared with the twenty-five they spend in the classroom. (4, p. 12)

Further evidence of that interest is to be found in the broadening stream of experimentation and research in the major countries of the world in the use of television in classroom instruction. A number of such studies carried out in the United States, Canada, France, and England will be reported in this investigation.

The great flexibility of the new medium is shown in the wide variety in the types of experimentation carried out. For example, there is the work of the noted physicist, Dr. Harvey White, who was brought to Pittsburgh from Berkeley, California, to prepare a filmed presentation of an entire year's work in high school physics. So popular has this course become, that it is now being shown in a number of states over television to more than 75,000 students each year. (5, p. 4)

San Francisco is also now carrying out a unique experiment in meeting the needs of exceptional high school students by giving them supplementary courses by television, and by helping them to earn college credits in advance.

At college level, medical and dental schools have been quick to use television to show intricate operations to large classes. Formerly, students crowded around the operating table only hoping to see the professional man's hands at work. Now, with television, they sit back and watch close-up shots of his every move.

Pittsburgh's "Summer School of the Air" provides television instruction for students who failed to pass courses the previous year. (5, p. 5).

At the university level, the first experimentation in the teaching of basic college course material was launched in 1954 by Pennsylvania State University. (6) After the results of the Penn State Experiment became known, other universities also began to experiment until in the fall of 1957 over twenty universities were offering credit courses by television. The University of Detroit began offering a complete freshman program by television in the fall of 1957; students came to the campus only for conferences and occasional discussions. San Francisco is now giving two freshman courses over television. Since 1954 the University of Houston has been televising the lecture part of freshman courses.

There has also been great and growing interest in television as an instrument of adult education. In Pittsburgh, any adult can earn a high school diploma by following two years of the "Adult School of the Air". In Memphis, Tennessee, over 1,000 adults who were illiterate can now write their names and read newspapers because they took two eight-week courses by open circuit television. (5, pp. 8-9) The news bulletin "Antenna" refers to the remarkable growth of teleclubs or collective viewing clubs which had their beginning in France in 1950, and which spread with the help

of UNESCO to Italy and Japan. In May, 1958, the French Government, as father of the enterprise, with the aid of UNESCO held an international meeting to compare results achieved through collaboration between educational and television authorities in nearly thirty countries. (7)

In the studies that are to be reviewed, a notable contrast in philosophy becomes apparent. Experimentation in Canada, France, and England is based upon the premise that the prime purpose of television in public instruction is to enrich and enliven conventional teaching. The formal teaching of basic course material has been relegated to a minor role or ignored altogether. On the other hand, much of the experimentation in the United States has been designed to test the feasibility of teaching basic course material to large groups by television. Siepman refers to a national program in the United States in which all of the co-operating schools have included variant tests of television's effectiveness in teaching large classes. (8, p. 72) One such study, that of St. Louis, is reported in this investigation. The Fund for the Advancement of Education has given heavy financial support to this type of research in the hope that it may provide an answer to the serious problem posed by the teacher shortage. This is diametrically opposed to the general trend of thought in Canada, France, and England where it is felt that television can never replace the classroom teacher.

Sources of Data

Principal sources of data used in this study were the following:

1. Reports issued by the local authority sponsoring the experiment. Among them are reports from St. Louis, Pittsburgh, Hagerstown, Maryland, Nebraska University, the B. B. C., the C. B. C., and the French Ministry of Education in Paris.
2. Educational journals and periodicals. Among them are a great number and variety of publications from the "Educational Television and Radio Centre" at Ann Arbor, Michigan.
3. Recent books from the various Winnipeg libraries.

Method of Procedure

The general procedure followed in this study has been to select experiments which bring into relief the varied facets of major problems relating to the use of television in the classroom. First of all, experiments were chosen which brought out the sharp contrast in underlying philosophy between the United States and other countries used in this study. Secondly, treatment has been such as to bring out the marked difference in degree of acceptance of the new medium among those countries which are in basic philosophical agreement as to its proper use. A final consideration was to choose experiments which were comprehensive in scope and which had been made the subject of worthwhile evaluation.

Definitions and Explanations of Terms

The Kinescope

The kinescope is a sound and sight recording that can be made in the studio from the television screen and rebroadcast any number of times.

Kinescopes made in closed-circuit television are available as 16 mm. films for broadcast and also for class use. Their special advantage is that they can be used at the proper time in the teaching process without concern for the schedules of the broadcast stations. (2, p. 206)

Closed Circuit Television

In closed circuit television, only sets connected to the television cable can pick up the television program as it does not go out over the air at all. This type of telecast gives great program scheduling freedom. Using it, a program can be shown in any room at any required time.

Educational Television

An educational television station is one under the complete operational control of the educational authority. It may be either open or closed circuit in type. Its great advantage is that time assignments will be kept intact. The chief disadvantage is its cost. (5 p. 13)

Commercial Television

A commercial television station is one operated by private interests for profit. Although it may and often does set aside some free time for educational telecasts, it prefers to sell its broadcast time to anyone willing to

pay for it. This means that the educational program may be put on at poor viewing hours, and often postponed or even cancelled on short notice. (5, p. 12)

Low Power Television

A low power television station is one operating on low power which may be in the vicinity of 500 watts. The effective range of such a station is likely to vary from a few miles up to approximately twenty-five miles. The advantage of such a station is that costs are greatly reduced.

CHAPTER II

HISTORICAL BACKGROUND

Dale states that "the history of education is a record of battles against the use of words without understanding". (4, p. 62) The truth of that assertion is amply borne out by the statements of philosophical principles found in the literature on education, and at the practical level, in the resulting modifications in methods of teaching planned to stress meaningful learning. One of the chief means of combatting the excessive verbalism to which Dale refers has been found in the use of audio-visual aids which have had rapid growth in our schools - particularly since the advent of television. It is the purpose of the present chapter to consider some of the historical aspects of that growth.

Christ spoke in parables to make his words more meaningful to the simple folk who heard him. Primitive man drew pictures to communicate ideas. The characters used in Chinese writing of the twelfth and thirteenth centuries, B. C., were pictures. The Plains Indians also made use of pictorial writing, a good example of which is to be found in the 'Buffalo Counts'. (14, pp. 758-759) In view of the use made of pictures in communication of ideas in the past, it is not surprising that visual aids, and later audio-visual aids should come to be regarded as valuable instruments of formal education.

The Dutch scholar Erasmus (1465-1536) advanced certain "new ideas" which he believed would make education more

meaningful. One of these was his belief that children should become acquainted with familiar objects and animals through informal methods such as stories, pictures, games and objective teaching rather than through mere memory. (7, p. 56)

John Amos Comenius (1592-1671) was so convinced that a graduated series of textbooks and illustrative materials was absolutely necessary for improved instruction that he prepared the first visual textbook in history, the *Orbis Pictis*, which contained some 150 pictures with each picture being made the object of a lesson. Although the *Orbis Pictis* had been planned as a textbook for teaching Latin, it was also used to teach reading in the vernacular. (4, p. 56)

Jean-Jacques Rousseau (1712 - 1778) for the same reasons condemned the prevailing stress on memorization without understanding. As a remedy, he proposed that children should learn "directly from nature." (4, p. 59)

Pestalozzi (1746 - 1827) suggested the sense perception or "object method" as a remedy for formalistic teaching. Ironically enough, this approach in time tended itself to become formalized, and eventually came under attack from the satirical pen of Charles Dickens. (4, p. 60)

It is interesting to note that the realization that an appeal could be made to the senses of sound and sight in a single audio-visual aid was slow in coming. Visual aids in the form of handdrawn illustrations came first, of which

the illustrated manuscripts found in many of the early monasteries are good examples.

Persistence of vision, upon which the illusion of motion pictures depends, was discovered and used by the Chinese many centuries before the birth of Christ. However, the first deliberate attempt to develop the principle itself, rapid superimposition of one still picture upon another in slightly different successive positions to create the illusion of motion, really began about 1825. (18, p. 110) The next stage of development came with an invention of Thomas Edison called the Kinetoscope which attracted considerable attention at the Chicago Fair in 1893. This machine did not project pictures, but was so arranged that one could look into it and view pictures which appeared to possess the power of motion. (18, p. 147) Dent states that when Thomas Edison began to produce pictures of objects in motion, and reproduce those pictures, he had in mind pictures that would illustrate recorded music. The results were not satisfactory, and the inventor came to the conclusion that pictures could have no great educational or commercial value. (16, p. 18)

The first workable motion picture projector was finally invented by two Americans, Francis Jenkins and Thomas Armat, and a Frenchman, Auguste Lumiere. Thus shortly after 1900 the motion picture theatre was born. (18, p. 147)

Pictures and sound were developed separately until the appearance of synchronized sound motion pictures about 1926.

Soon after this sound pictures for educational use were developed. (16, p. 18)

In regard to the function of audio-visual aids in instruction, Rivlin and Schueler have said:

"Recent technological advances such as the sound motion picture, the radio, and improved projection apparatus, have made available to the schools the means for realistic perceptual learning...properly used, auditory and visual aids should stimulate discussion, exploration, and effort." (21, pp. 69 - 70)

The foregoing is supported in considerable measure by a survey made by Monroe of relevant research by Anspiger and others in the field of experimental psychology. The conclusions drawn by Monroe on the basis of the survey are summarized as follows:

1. Audio-visual aids supply a concrete basis for conceptual thinking, and hence reduce meaningless word responses for students.
2. They have a high degree of interest for students.
3. They supply the necessary basis for developing learning, and hence make learning more permanent.
4. They offer a reality of experience which stimulates self-activity on the part of the pupils.
5. They develop a continuity of thought. This is especially true of motion pictures.
6. They contribute to growth of meaning, and hence vocabulary development.
7. They provide experiences not easily secured by other materials, and contribute to the efficiency, depth, and variety of learning.

Since the survey made by Monroe, television has been added to the growing family of audio-visual aids, and has

in a few short years reached a remarkable stage of development. Both its recency and rapid development have been well brought out by Dale, who stated that the world's first telecast of high definition was made by the BBC from Alexandra Place in 1936. Five years later commercial television was a fact in the United States, and within seven years 108 stations were in operation. By the end of 1953 more than 27,000,000 American homes were equipped with television sets. (15, p. 198)

In spite of the recency of television, a great deal of study and research has gone into exploration of the potentialities of this new medium in the field of classroom instruction. A number of the more important experiments are dealt with in the present report.

CHAPTER III
REVIEW OF EXPERIMENTAL STUDIES
THE PITTSBURGH EXPERIMENT 1955-1956

Introduction

Purpose of the Experiment

1. To test the hypothesis that television teaching can be used to advance the pace and quality of teaching by offering the following advantages:
 - (a) Superior teaching.
 - (b) The use of illustrative material too costly or too time consuming for the average school to provide.
 - (c) Enhanced visibility. (22, p. 55)
2. To determine the reactions of pupils, teachers, principals, and parents to television teaching.

Scope and Duration of the Experiment

The plan provided for the day-to-day teaching over television of reading, arithmetic, and French for fifth-grade pupils followed with supplemental teaching by classroom teachers. Originally it was intended that there should be no supplemental teaching in French. However, as the need for supplementary teaching became apparent, teachers did develop a variety of supplementary programs for the French lessons. (25, pp. 129-130)

The teaching demonstration was to continue throughout the entire school year 1955-1956. This was the first

year long demonstration of television teaching to take place anywhere in the world. (22, p. 51)

Financial Support

The experiment was launched with the aid of a grant of \$150,000.00 from the Fund for the Advancement of Education. An added grant was received from the Mellon Education and Charitable Trust Fund. (45, p. 33)

Testing and Evaluation

Intelligence and standardized achievement tests were administered early in the fall term. Separate matched groups in reading and arithmetic were drawn up on the basis of the results of these tests. Standardized tests were administered again at the end of the term. Pretest and end test data for the matched groups were tabulated and analyzed.

Five attitude questionnaires were administered to teachers, pupils, parents, and principals. Two of these were prepared in alternate forms for comparison of pupils with their parents. Responses on the questionnaires were compiled, tabulated, and analyzed. (25, p. 131)

Matching Procedures

A total of twenty television classes, and nineteen comparison classes participated in the experiment. Intelligence, reading achievement, and arithmetic achievement tests were administered during the third week of school. Results of these tests were summarized (25, p. 133) and showed that such large differences existed between the television and comparison classes that it was necessary to equate the two groups in some way. The method chosen was

that of matching paired pupils from the two types of classes.

Matching Procedures for Reading and Arithmetic

"Pupils in the TV and comparison groups were matched so that the grade equivalent pretest scores in reading and/or arithmetic for a pair differed by no more than two months, and I. Q. scores differed by no more than five points."

(25, p. 134) The matching was done in such a way as to minimize differences growing out of socio-economic status, geographical location, and individual school climate.

The foregoing procedures were carried out separately for reading and arithmetic. Two matched lists were thus developed with 343 pairs for reading, and 349 pairs for arithmetic.

The intelligence and pretest data for the matched groups is shown in Table I. As indicated in the Table, the TV and comparison sections were almost identical in means and standard deviations with respect to I. Q.'s and pretest scores. (1, p. 134)

An examination of pretest data indicated that not all pupils who were matched in reading were matched closely in basic language skills, and in work-study skills. For this reason additional matching within the matched reading groups was carried out for each of these areas. Pairs of pupils from the matched reading lists were included for each area if their appropriate equivalent pretest scores did not differ by more than four months. Two matched lists

TABLE I
SUMMARY OF I. Q. AND PRETEST DATA FOR
MATCHED READING AND ARITHMETIC GROUPS

Subject	Group	No. of Pupils	I. Q.		Pretest	
			Mean	S. D.	Mean	S. D.
Reading	TV	343	109.0	10.9	5.58	15.4
	Comparison	343	108.59	10.7	5.58	15.1
Arithmetic	TV	349	108.60	10.8	5.09	9.0
	Comparison	349	108.50	11.1	5.08	8.9

were thus developed, with 139 pairs for basic language skills, and 161 pairs for work-study skills. The resulting mean pretest scores in basic language skills were 4.9 for the TV pupils and 4.9 for the comparison pupils. In work-study skills they were similarly identical at 4.8. (25, p. 135)

Methods of Teaching

Teaching Time

The equivalent of six forty-minute periods each week was prescribed for reading. For the TV classes, five periods per week, each twenty-five minutes in length, formed the core of the program. The remaining classroom time was allotted for supplementary teaching by classroom teachers. All TV classes gave up the supplementary period each week in order to have twenty-five minutes of supplementary teaching each day instead of fifteen minutes as planned. This felt need

for additional supplementary time crops up repeatedly in the report, particularly in regard to arithmetic teaching.

Of the comparison classes, eleven used the same amount of reading time as the TV classes. The remaining eight classes used somewhat less time. Thus there was a slight time advantage given to the television group.

The recommended time allotment for arithmetic was five forty-minute periods with the teacher having five minutes with her class before the twenty-five minute television presentation, and ten minutes supplementary teaching after it. Sixteen of the TV classes used the suggested time arrangement. Four of the TV classes used more than the recommended time. One classroom teacher used five and another ten minutes extra time per day; two others used an entire extra period per week.

Fourteen of the comparison classes in arithmetic adhered to the recommended time allotment; five classes used slightly less than the suggested time allotment.

The television lessons in French lasted for twenty minutes each day. Supplementary time arrangements were left to the various schools, and varied from no time to twenty minutes a day.

Teacher Selection

The selection of classroom teachers for the television classes was made by principals for the most part on the basis of ability, experience, and willingness to participate. There was no special selection of teachers for

seventeen of the nineteen comparison classes. Thus more special care was given to the assignment of teachers to the television classes than to the comparison classes.

Great care was used in selecting the two television teachers of reading and arithmetic. Outstanding success as a classroom teacher was the prime requirement. In addition, consideration was given to warmth of personality, adaptability, fluency, voice quality, good health, appearance, emotional maturity, and willingness to undertake the hard work involved.

The teacher of the French lessons spoke French fluently, having lived and studied for some time in France.

Organization for the Television Teaching

The reading and arithmetic teachers were relieved of all duties except preparing and teaching the daily lessons over television. The French teacher carried a half time regular assignment in addition to the foregoing. The television teachers were employed full time for two months to plan the lessons prior to the beginning of the demonstration.

Station WQED employed a full time producer assisted by a production staff of eleven.

Close supervision of content and teaching techniques in the three subjects was maintained by the elementary education supervisors.

TV Teaching Methods - Reading

The television teacher first separated the possible reading activities into two groups as follows:

1. Reading activities suitable for TV presentation:
 - (a) Motivating stories - giving background and developing vocabulary.
 - (b) Extending skills and abilities such as phonetic and structural analysis, dictionary skills, use of reference materials, and use of context clues.
 - (c) Extending interests through discussion of books, reading from books, story-telling, use of source persons as guests and others.
2. Reading activities which, of necessity, must be handled in the classroom:
 - (a) Guided reading of the story.
 - (b) Discussion of story.
 - (c) Sharing interests.
 - (d) Meeting of individual needs.

The foregoing division became the basic outline upon which the television lessons and the supplementary lessons were planned throughout the year.

The last item in the foregoing list was an all inclusive one. The classroom teachers at one time or another had to engage in most of the activities listed for the television lessons in order to meet individual needs. A development which had been taught during a television lesson might have to be reviewed, retaught, or drilled upon for either one or several pupils or even for the whole class. Actually, the major supplementary activities in some classrooms were of this type.

Provision for Pupil Participation

The planners of the TV lessons felt it imperative to involve the pupils in as much active participation as possible. The following list includes the major types of such activities:

1. Looking up words in the glossary and dictionary.
2. Breaking words up into syllables.
3. Repeating vowel and consonant sounds.
4. Reading words and phrases to note similes and use of other figures of speech.
5. Reading words and phrases for sensory imagery.
6. Locating certain words and phrases.
7. Answering questions to which short common answers are obvious.
8. Performing written work involving root words, suffixes, prefixes, the placing of accent marks, the designation of long and short vowels, and similar activities.
9. The TV teacher often asked thought-provoking questions to which she would give the answer, but only after waiting for a moment for the pupils to consider the question, and to arrive at their own answers. Some classroom teachers reported that some pupils reacted very passively to these questions as they knew that the TV teacher would soon give the correct answer.

Basic Lesson Patterns (25, p. 141)

The basic plan followed in reading was to devote three lessons to each of the twenty-eight stories in fifth grade reading, and to supplement this with an introductory motivating lesson and a concluding or summary lesson for each unit.

The three lessons for each story developed into the following pattern:

1. A motivating lesson.
2. A lesson primarily concerned with developing fundamental language understandings, and word attack skills, and developing basic interpretative skills and abilities.
3. A lesson to extend the interests of the child.

Supplementary teaching formed an important part of the basic program. Instructions and suggestions were sent regularly to the classroom teachers so that the TV and supplementary phases of the program could be correlated more efficiently. These were in outline or chart form and were composed of three parts as follows:

1. Part I giving the general idea of the lesson to be taught on TV.
2. Part II - suggested follow-up by the classroom teacher.
3. Part III listing the material required by the pupils.

Outlines were for two-week periods, and were sent to the classroom teachers well in advance.

The outlines occasionally included lists of supplementary books which the TV teacher planned to refer to or read from during various lessons so that classroom teachers could have them available for pupil use after the TV lessons. On occasion, written material to be placed on the blackboard was included where such writing was too lengthy for effective presentation on television.

Use of Visual Presentations

"The basic philosophy of the producers of the television lessons was that television is a visual medium, and unless visual presentations are used, its effectiveness has not been realized." (25, p. 142) The greatest use of visual aids was in the field of reading. In addition to the frequent use of studio cards, still pictures, slides, props, tapes with special sound effects, and others, there were many dramatic readings by the TV teacher from a large number of supplementary books aimed at stimulating wider reading on the part of pupils. Lists of such books had been supplied beforehand to the teachers so that the books could be available for pupil use after the programs.

Some of the better book reports, and creative writing of the pupils were displayed and read on television. Fifty-two television guests appeared on the programs during the year, among them Robert Frost who "undoubtedly heightened interest in poetry by the effective reading of his own poems." (1, p. 143)

Television Teaching Methods in Arithmetic

The television lessons followed the pattern of good classroom lessons including as they did the three usual phases of arithmetic lessons:

1. Motivation.
2. Explanation.
3. Drill and practice.

The supplementary teaching was expected to reinforce these, and to make provision for meeting individual differences.

The television lessons in arithmetic involved considerable pupil participation. After the TV teacher had explained a process, she then presented similar problems for the pupils to work. After allowing time for the pupils to work the problems, she would then work each problem step by step. Most of the time, the pacing of the work was too fast for some pupils and too slow for others. The problem of pacing presented much more difficulty in arithmetic than it had in reading.

Good use was made of visual aids in teaching arithmetic. The TV teacher made use of a large variety of aids including such things as an enlarged ruler, a magician's hat...a skyscraper of arithmetic learning, and a miniature house with removable sides for teaching areas. (25, p. 54)

Teaching Methods Used in French (25, p. 147)

Textbooks were not used for the French program, nor was there any established course of study. The basic method used by the TV teacher was the aural-oral method in which an attempt was made to reproduce as closely as possible the processes by which the child learns his own language. The teacher used the phonetic approach showing close-ups of the movement of lips, tongue and teeth for various sounds. An attempt was made to develop a vocabulary related to the real life of fifth graders so that

each child could use what he had learned throughout the day. This vocabulary pertained mainly to the school, the home, and the immediate community of the child.

Limitations of the French Program

The failure to establish comparison classes in French makes it necessary to base any evaluation of the French program on the opinions of the teachers, principals, and supervisors involved in the experiment.

Test Results

A. Reading Test Results.

Tests Used

Test A: Silent Reading Comprehension, Iowa Every Pupil Tests of Basic Skills, Form O. The test was administered in September, 1955, for pretest scores, and in May, 1956, for end test scores.

Results for the Total Matched Group in Reading

The TV and comparison groups were almost identical in means and standard deviations for the I. Q. and pretest scores. On end test scores, the comparison group showed a gain of about one month in excess of the TV group. The difference was significant at the one per cent level of confidence. Table II presents the data for the 343 matched pairs of pupils.

Matched Groups Partitioned According to I. Q. Levels

The 343 pairs of pupils were divided into three groups on the basis of I. Q. as follows:

TABLE II

I. Q. AND READING TEST DATA FORMATCHED READING GROUPS

Group	No. of Pupils	I. Q.		Grade Equivalent Scores				Mean Gain	Diff. in Mean Gain	t-ratio
		Mean	S.D.	Pretest		End Test				
				Mean	S.D.	Mean	S.D.			
TV	343	109.1	10.9	5.58	15.4	6.58	15.1	1.00		
Com- pari- son	343	108.6	10.7	5.58	15.1	6.72	14.8	1.14	.14	3.47 X

X Significant at the 1% level of confidence

Group I - I. Q. of 117 and above.

Group II - I. Q. of 102-116 inclusive.

Group III - I. Q. of 101 and below.

Significant gains were made by the comparison group in the upper and middle I. Q. groups. There was no significant difference between the groups at the lower I. Q. level. TV pupils did not exceed comparison groups at any of the three I. Q. levels. Table III supplies the data on which the foregoing statements are based.

B. Arithmetic Test Results

Test results in arithmetic were obtained from administering of the SRA Achievement Series, Grades 4-6, Arithmetic, Form A. The test was administered twice: in September, 1955, and in May, 1956.

TABLE III
 READING TEST DATA FOR MATCHED GROUPS
 PARTITIONED ACCORDING TO I. Q. LEVELS

I. Q. Groups	No. of Pupils	Mean Grade Equivalent Scores				t-ratio
		Pre-test	End Test	Gain	Differ-ence	
I - TV	89	7.26	8.08	.82		
I - Comparison	89	7.24	8.21	.97	.15	2.04 (1)
II - TV	170	5.46	6.51	1.05		
II - Comparison	170	5.47	6.71	1.24	.19	3.42 (2)
III - TV	84	4.05	5.15	1.10		
III - Comparison	84	4.03	5.18	1.15	.05	.03 (3)

I - Group I with I. Q.'s of 117 and above. (1) Significant at the 5% level of confidence.

II - Group II - I. Q.'s 102-116. (2) Significant at 1% level.

III - Group III - I. Q.'s of 101 and below. (3) Nonsignificant.

The tables are not here included but may be found as Tables VI and VII of The Pittsburgh Study. (25, pp. 154-155) The first of these tables showed that the TV and comparison groups were almost identical in means and standard deviations for the I. Q.'s and for pretest scores. On end test scores, the comparison group showed a gain of one month in excess of the gain made by the TV group. The difference was significant at the 1% level of confidence.

It was also found that significant gains were made by the comparison group over the TV group at the upper and middle levels. There was no significant difference in gains made by pupils in the lower I. Q. group. As in the reading tests, TV pupils did not exceed comparison pupils at any of the three I. Q. levels.

C. Work-Study Skills.

Test results in work-study skills were obtained from administering Test B: Work-Study Skills, Iowa Every-Pupil Tests of Basic Skills, Form O. Pretests and end tests were administered during the test periods used for tests in reading and arithmetic.

Table IV presents the test results for pupils in the matched reading group who were also matched in work-study skills. The data show that, on the test in work-study skills, comparison pupils made an average gain 1.2 months greater than that made by TV pupils. This difference was not statistically significant, although the t-ratio of 1.76 approached the ratio of 1.96 required for significance at the 5% level of confidence.

D. Basic Language Skills.

Test results for basic language skills were obtained from administration of Test C: Basic Language Skills, Iowa Every Pupil Test of Basic Skills, Form O. Pretests and end tests were administered during the test periods used for tests in reading and arithmetic.

TABLE IV
TEST RESULTS IN WORK STUDY SKILLS

Group	No. of Pupils	Mean Grade Equivalent Scores			Difference	t-ratio
		Pretest	End Test	Gain		
TV	161	4.84	5.97	1.13		
Comparison	161	4.84	6.09	1.25	.12	1.76 X
X Nonsignificant.						

Table V presents the data for pupils in the matched reading group who were also matched in basic language skills.

The data show that on the test in basic language skills, comparison pupils made an average gain of 1.8 months in excess of that made by the TV pupils. This difference was significant at the five per cent level of confidence.

E. Test Results in French.

As there were no comparison classes in French, comparable data could not be secured. However, it became evident early in the year that wide variations were developing in supplementary teaching. Accordingly, the work of each teacher in supplementary teaching was rated by teachers, principals, and other observers. On the basis of these reports the supplementary program of each teacher was rated as good, fair or poor.

Test data for pupils in the classes with good and poor supplementary teaching are shown in Table VI. It shows

TABLE V
TEST RESULTS IN BASIC LANGUAGE SKILLS

Group	No. of Pupils	Mean Grade Equivalent Scores				t-ratio
		Pretest	End Test	Gain	Difference	
TV	139	4.88	6.06	1.18		
Comparison	139	4.91	6.27	1.36	.18	2.78 X
X Significant at the 5% level of confidence.						

TABLE VI
FRENCH TEST DATA FOR PUPILS IN CLASSES HAVING
GOOD OR POOR SUPPLEMENTARY TEACHING PROGRAMS

Type of Supplementary Teaching	No. of Classes	No. of Pupils	Mean Raw Score
Good	7	215	92
Poor	9	243	78

that pupils with good supplementary teaching had a mean raw score fourteen points higher than pupils who had poor supplementary teaching.

Analysis of Unit Questionnaires

Teachers were asked to rate the interest of pupils in the TV lessons during each unit by checking one of the three levels - high, medium, or low. The results indicated that there was much more high pupil interest in reading than in

either of the other subjects as taught by television. There was high interest in reading for 80% of the observations, while the percentages for arithmetic and French were 38 and 46 respectively.

The producers of the TV lessons, as well as the classroom teachers and other observers were in almost unanimous agreement that reading lent itself to variety in presentation and to use of enrichment materials to a greater degree than was true for either arithmetic or French.

Teachers also listed more high interest areas and fewer low interest areas for reading than for either of the other two subjects. The ratio of the high interest areas to low interest areas was ten to one for reading, seven to one for French, and five to one for arithmetic. The listings for the three subjects were quite different. The areas of high interest listed most frequently for reading were guest appearances, the TV teacher's introductions and readings, the stories in the text, and the use of visual devices in that order. In arithmetic, they were real life applications of arithmetic, the arithmetic processes themselves, games and puzzles, and manipulative material. The principal listings for French pertained to real life vocabulary development, to the use of dolls, puppets, and other figures, and to the background material, including storytelling in English and French.

Although low interest listings were few in number, they showed that certain presentations which resulted in

high interest for some classes had the opposite effect with others. They also showed that pacing of the arithmetic and French lessons was unsatisfactory for some of the classes.

Pacing of the TV Lessons.

Teachers were asked to check whether the TV lessons during each unit had moved along too fast, about right, or too slow for their separate classes. This revealed that pacing was a major problem for the TV arithmetic teacher. The French teacher also had much difficulty with pacing. In contrast the reading teacher had few pacing problems. Pacing of the reading lessons was considered satisfactory in 92% of the cases.

Adequacy of Supplementary Time.

According to the teachers, the amount of supplementary time was considered adequate in three-fourths of the cases for reading but only in about one-fourth of the cases for arithmetic. Those desiring more supplementary time for reading suggested that more time was needed for guided reading; for silent and oral reading; for extended interpretations; for checking pupil's work and progress; for working on and presenting book reports; for giving individual help, especially to slow learners; and for completing various projects. The need for time for active pupil participation was indicated by several teachers.

In arithmetic, teachers indicated that more time was needed for reteaching, clarification and drill, for dealing

with individual differences, and individual learning problems. The supplementary time was not found adequate for the teachers to meet these needs in most of the twenty classes.

Suggestions for Improvement of the Television Programs

Each unit questionnaire included a request for the classroom teacher to list any suggestions for improvement in the television program.

One-fifth of the suggestions for improving reading programs were for more active pupil participation. Most of the remaining suggestions were for rather minor adjustments which would have made the television programs more suitable for a particular class. While some classes needed more supplementary time, most did not. While some wanted television lessons shortened, most did not. If most of these suggestions had been adopted, the television lessons would have been more suitable for the classes making the suggestions, and less suitable for the rest.

Most of the suggestions for arithmetic had to do with increasing supplementary time while reducing TV time, and with improving the pacing. These were the two most pressing problems which developed in the arithmetic program and it is probable that they were interrelated. Suggestions about supplementary time varied from those for making small adjustments in time to those for scheduling TV lessons on alternate days only. The pacing suggestions

included opposites: to speed up the program and to slow it down; to use more difficult examples and problems and to use simpler ones; to allow more time for pupils to work problems and to allow less time. The TV teacher was confronted with the problem of pacing the lessons on a middle course between these two suggestions.

In regard to the teaching of French, most of the suggestions indicated that pacing of the TV lessons had been too rapid, with insufficient repetition. A number of teachers thought that the use of more visuals would have improved the French lessons. ✓

Results from End-of-Term Questionnaires.

Relative Suitability of Subjects for Television Teaching.

"Practically all persons concerned with the TV teaching in any way agreed that the differences in the ratings for the reading and arithmetic lessons were inherent in the comparative suitability of the two subjects. Reading appeared to be more suitable than arithmetic for television teaching for two reasons:

1. Reading offered far greater opportunities for abundant, various enrichment presentations than was true for arithmetic, a type of presentation in which pacing problems were seldom noticed; and
2. Arithmetic required far more in the way of skills presentations involving much practice

and drill, a type of presentation in which pacing difficulties were quite pronounced. There were two general agreements as to the cause of the comparative low rating of the French lessons: (1) the potentialities of television for teaching purposes had not been exploited to any great extent with the French lessons; and (2) effectiveness of the French lessons was decreased by the absence of competent supplementary teaching in a number of classes." (25, p. 170)

Chief Values of Television Teaching.

"Teachers and principals agreed that the chief value of television teaching in comparison with regular classroom teaching was its ability to bring abundant enrichment to pupils through guests, visual aids, devices, and other supplementary materials. Both groups recognized to a lesser extent the values in the skill, the techniques, and the continuous high-quality preparation evident in the TV teaching." (25, p. 171)

Chief Values of Regular Classroom Teaching.

"Both teachers and principals agreed that the chief values of regular classroom teaching over TV teaching pertained to various pupil-teacher relationships. These included the teacher's recognition of group and individual

differences and needs, and the resulting individualized attention to instructional and adjustment problems. These also included the teacher's role in stimulating class discussion and in adjusting the pacing of the lessons to the requirements of the group." (25, p. 172)

Effect of Participation in the
TV Teaching Program on Classroom Teachers.

"Most of the classroom teachers agreed that participation in the TV teaching program had provided them with valuable in-service training. This value was recognized more for the reading lessons than for either of the other programs. The wealth of enrichment materials on the reading programs, along with expert use of the teacher's manual for the reading text, were chiefly responsible for this."..."While teachers recognized the values of watching experts teaching on television, they were not unanimous in being enthusiastic about the use of TV teaching as practised throughout the year. Of the twenty classroom teachers, nine expressed a preference for continuing participation in such a program for the next year, six said they would prefer not to do so, and five indicated that they had no preference in the matter." (25, pp. 172-173/

Findings and Conclusions

A Summary of the Major Findings.

1. End-of-term grade equivalent scores in reading and in arithmetic were each about one month greater for the

comparison pupils than for the TV pupils. The differences were significant at the one per cent level of confidence.

2. Comparison pupils made significantly greater gains than the TV pupils in arithmetic and reading, in the upper and middle I. Q. groups. There was no significant difference between the two groups in the lowest I. Q. group.

3. Although the comparison pupils exceeded the TV pupils in mean gain on the test in work-study skills, the difference was not significant.

4. On the basic language test, comparison pupils exceeded TV pupils in mean gain by almost two months. The difference was significant at the five per cent level of confidence.

5. On the French test, pupils with good supplementary teaching showed a mean average raw score that was fourteen points higher than that of the pupils who had poor supplementary teaching.

6. Both teachers and pupils ranked reading, arithmetic, and French in that order in terms of instructional effectiveness.

7. Classroom teachers, in 80% of their observations throughout the year, stated that interest in the TV reading lessons had been high. The comparable percentages for arithmetic and French were 38 and 46 respectively.

8. Both TV pupils and comparison pupils reacted very favorably to their lessons in reading and arithmetic, with

only slight differences between them. Reaction toward the French lessons was much less favorable.

9. The percentages of pupils wishing to have TV lessons continued were seventy-one per cent in reading, sixty-four per cent in arithmetic, and fifty-five per cent in French. The middle I. Q. groups (I. Q.'s 102-116) registered the highest percentages for continuing the TV lessons in both reading and arithmetic, while the upper I. Q. group gave the lowest percentages for both subjects. The middle and upper I. Q. groups gave about equal percentages of favorable responses for the French lessons, while the lower I. Q. group responded least favorably.

10. The percentages of parents who wished to have the TV lessons continued were seventy per cent for reading, sixty-three per cent for arithmetic, and sixty-two per cent for French.

11. In specifying areas of high and low interest in the TV lessons, classroom teachers listed more high interest areas and fewer low interest areas in reading than in either of the other subjects.

12. The TV reading lessons inspired much more out-of-class activity on the part of pupils than did either of the other subjects. The bulk of the outside reading activities consisted of supplementary reading, the writing of stories, and verse.

13. Learning problems encountered in the supplementary periods varied from class to class and were more numerous for arithmetic than for reading. The problems for the most part pertained to the development of basic skills, especially with slow learners.

14. Teachers found little difference in regard to the status of homework resulting from the use of TV lessons in either reading or arithmetic.

15. Classroom teachers found pacing to be satisfactory in ninety-two per cent of their observations throughout the year. Comparable percentages for arithmetic and French were sixty-seven and seventy-five respectively.

16. The amount of supplementary time was considered satisfactory by teachers in seventy-five per cent of the cases for reading, but only one-third of the cases for arithmetic.

17. Eighteen of the nineteen principals were satisfied with the time division between the TV period and the supplementary period for reading; only three were satisfied with the time division in arithmetic.

18. Teachers and principals agreed that the chief value of regular classroom teaching over TV teaching pertained to various pupil-teacher relationships and adjustments to the individual differences of pupils.

19. Teachers and principals agreed that the chief value of television teaching in comparison with regular classroom teaching was its ability to bring abundant

enrichment to pupils.

20. Teachers made fifty per cent more suggestions for improving the TV teaching program in arithmetic than they did in reading. The main suggestions for reading improvement were increasing pupil participation and more supplementary time. These suggestions were made by only a few teachers. In arithmetic, however, the majority of the teachers made suggestions for increasing the amount of supplementary time considerably, and for improving the pacing of the lessons. The suggestions for French were mainly aimed at securing better pacing and a more extensive use of visuals.

21. Eight of the nineteen principals and supervisors suggested that in future the general focus of the TV teaching programs be changed from that of regular day-to-day teaching of the curriculum to one which would emphasize in-service education or enrichment programs. Eight of this group also suggested that time allotments be rearranged by reducing the TV teaching time and/or by increasing the supplementary time.

22. Most of the classroom teachers agreed that participation in the TV teaching program had provided them with valuable in-service education.

23. While most of the TV classroom teachers listed a number of values in the TV teaching program, only nine

of the twenty teachers expressed a preference for continuing to participate in the program the next year. Six teachers said that they preferred not to do so, and the remaining five expressed no preference.

25. Almost three-fourths of the parents of TV pupils indicated that they had watched the TV lessons in each subject at least several times during the year.

25. About one-half of the parents of the TV pupils believed that viewing the TV lessons had kept them informed on teaching methods and school programs and had helped them to understand better what the school was trying to do and had made it possible for them to be of more help to their children with their school work.

Conclusions.

The study led to the following conclusions:

1. "Under conditions similar to those that existed in the demonstration program there may be little observable difference between the instructional effectiveness of TV teaching and regular classroom teaching." (25, p. 181)

2. Specially selected teachers, each giving full time to the production of one TV lesson each day, and assisted by several specialists, can produce lessons which excel those of the average classroom teacher in uninterrupted smoothness, clarity of presentation, effective

transition from one type of presentation to another, and in the employment of visual and enrichment materials.

3. TV teaching can make it possible to present enrichment programs which are impossible or impractical for the regular classroom teacher to prepare. The TV visits of Robert Frost illustrated this point.

4. The conditions under which pupil interest is likely to be highest are:

- (a) If there is much use of enrichment material.
- (b) If the lessons are suitable varied.
- (c) If lessons are properly paced.
- (d) If there is provision for considerable pupil activity.

5. TV lessons seem to lack flexibility with regard to individual differences. The tendency is to pace lessons to the needs of the middle I. Q. group. This means that the needs of pupils both above and below the average group can only be met if these groups receive much attention from the classroom teachers.

TV presentations are presented on predetermined dates, regardless of the readiness of the pupils to receive them. Thus the TV teaching as practised in the Pittsburgh experiment lacks flexibility in regard to timeliness.

6. Some subjects may lend themselves to TV teaching better than others. In this experiment, reading appeared

to be more suitable than either arithmetic or French, particularly in regard to the possibility of enrichment, the matter of pacing, and adequate use of supplementary time. Other subjects which require less in the way of skills development than the subjects used in this test may be better suited to TV teaching. Social Studies and Science might thus prove particularly well suited to TV teaching.

7. It is doubtful if TV teaching without supplementary classroom instruction can be a satisfactory substitute for regular classroom teaching at the elementary school level. A classroom teacher is needed to meet individual needs, to maintain good teacher-pupil relationships, to carry on drill and practice activities, to answer questions, and to provide for the interaction involved in class discussion.

8. The TV lessons gave valuable in-service education to a number of teachers. It is possible that TV demonstration lessons could be a worthwhile source of in-service training for teachers.

9. The findings in this study would indicate that a large percentage of teachers are not likely to welcome regular TV lessons as a major part of their classroom program. They may welcome the use of such lessons on a limited scale.

10. Parents are not likely to offer much resistance to the use of TV in classroom instruction.

11. "There probably will not be a serious either-or question as far as the use of TV and regular classroom teaching is concerned, at least at the fifth grade level. The problem is more likely to be one of determining the judicious use of each type of teaching according to situations or needs as they develop." (25, p. 183)

THE ST. LOUIS EXPERIMENT

Introduction

Objectives

The objectives of the experiment are quoted from the report issued by the St. Louis public schools which stated that answers were being sought to the following questions:

1. Is it possible for a competent television teacher to teach large groups of children effectively without supplementary activities?
2. Is it possible that the traditional pattern of classroom instruction can be modified so that an entirely new concept of teaching personnel, numerically and functionally, may be developed?
3. What is the reaction of pupils and teachers to large group direct television teaching? (26, p. 2)

In amplification of the foregoing, Charles Siepman has stated that the aims of this experiment were in two respects similar to those of the Pittsburgh Experiment. It was hoped to prove or disprove that (1) the TV medium has inherent resources calculated to enrich and enliven conventional teaching; (2) that through TV the influence of the ablest teachers in a school system can be extended to more students than their particular classes, and that the standards of teaching may thus be raised. "But this apart, St. Louis was out after bigger game. This was to be an experiment in direct teaching without assistance

from a classroom teacher." (22, p. 61)

Sponsorship

The experiment was carried out during the year 1955 - 1956 by the St. Louis Public Schools and the Educational Television Station KETC under the auspices of the Fund for the Advancement of Education from which it received heavy financial support.

The Experimental Design

The general plan as outlined in the report of the St. Louis Public Schools included the following points:

1. Instruction would be offered in three subject-matter areas: ninth grade science, ninth grade English composition, and second grade spelling.
2. Such instruction was to be given to large groups (up to 150 in number) by means of television alone without any supplementary teaching of the receiving groups.
3. Instruction would continue for one semester, thirty minutes per day, five days per week in general science and English composition. Instruction in spelling would continue for twenty minutes a day, five days a week for two semesters.
4. This instruction would be carried on in the St. Louis public high schools and in three St. Louis public elementary schools.

5. Achievement would be measured and compared with that of a similar number of pupils in control groups.

Selection of Teachers and Their Duties

The three teachers of the television courses were all experienced teachers who were selected principally on the basis of success in classroom teaching, warmth of personality, pleasantness of manner, and fluency of speech. These teachers were given full time to devote to the preparation and presentation of the television lessons. They were given complete autonomy, and were allowed to teach their courses in any way that they preferred.

Seven teacher assistants helped the seven supervising classroom teachers with such tasks as taking attendance, marking papers, and preparing reports. They did no teaching. The three assistants in the elementary schools were employed half-time; the four assistants in the high schools were university graduates who were employed full time.

Content of Courses

The course in Grade IX General Science followed the first ten chapters of the text, Science in Everyday Life, by Chourn, Heiss, and Montgomery.

In Grade IX Composition, about 40 per cent of the time was devoted to writing, 20 per cent to grammar and usage, 20 per cent to word study, and 10 per cent to capitalization.

Television classes were required to take notes, use their texts, take tests, and do home assignments as required.

Enrolment and Scheduling

The television lessons were telecast daily, Monday through Friday, from February 8 through June 6 for a total of seventy-nine lessons.

The enrolment in the experimental classes in general science was 267, and in Grade IX composition 268. The enrolment in spelling was 257.

Feedback

In an attempt to compensate for the lack of pupil-teacher interaction, which is an inherent weakness of television teaching, every effort was made to stimulate pupil involvement in the lessons. In addition, there was a daily report from each supervising teacher in the receiving classrooms to the co-ordinator and the television teachers. This was termed "feedback." The foregoing reports were made available to the television teacher the next morning before the telecast for that day. A copy of the daily report is shown in Appendix A. (26, p. 7)

Equipment and Facilities

Classrooms

The report suggests that the physical conditions under which the classes received the telecasts were far from ideal. In the two secondary schools, large music rooms

with banked tiers of seats were used. Four television sets were placed across the front of the room. In the elementary schools, large lunch rooms were used with the pupils being seated at long tables arranged in front of the four television sets. (26, pp. 7-8)

On recommendation of experts, a twenty-four inch rather than a twenty-seven inch screen was used because of ease of maintenance, cost, and clarity of image. The sets were equipped with a ten-inch speaker mounted in front of the stand below the set. The screen was set up in such a way that its centre was five feet, eight inches from the floor, approximating the height of an average teacher.

The Station

KETC-TV is a non-profit, very high frequency community owned and operated educational station, functioning under the control of the St. Louis Educational Television Commission.

Before the beginning of the experiment, kinescopes of lessons were prepared to be made use of by teachers for purposes of self-criticism and evaluation. During the term, several lessons were kinescoped and telecast in order that teachers might have the opportunity to visit the receiving classrooms and view actual reception and utilization of their lessons.

Evaluative Criteria

Comparison of Groups

Comparison of the experimental and control groups was established on the basis of I. Q., age, and father's occupation as an indication of socio-economic status.

Tests of Achievement

Gain in achievement was determined by means of a pre-test and a post test administered to both the experimental group and control group.

In General Science, the Read General Science Test, Form AM, was used in February, and Form BM in June. Test No. 6 of the Iowa Tests of Educational Development Series, entitled "Ability to Interpret Reading Materials in the Natural Sciences" was administered at the same times.

Achievement in English Composition was measured by the Greene-Stapp Language Abilities Test, Form AM and BM. This was supplemented by the use of the "General Vocabulary" Test No. 8 of the Iowa Tests of Educational Development.

Achievement in Spelling was measured by the St. Louis Public Schools Diagnostic Spelling Test. The foregoing test is designed to measure pupil's ability to spell words which are illustrative of specific spelling principles. The test consists of two parts: part one for Grades II and III, and part two for Grades III through VI. In order to check on upper levels of achievement, both parts were administered.

Subjective Evaluations

The objective evaluation data was supplemented by observations and statements of opinion from a number of sources. Dr. Mark Shinnerer, Superintendent of Metropolitan Cleveland public schools, and Mr. Omer Carmichael, Superintendent of metropolitan public schools in Louisville, observed and evaluated the project. Evaluations of the work were submitted by television teachers, supervising teachers of the receiving classes, and principals of the experimental schools.

Findings

Socio-Economic Status

A comparison of socio-economic status of the control and experimental groups was made in each subject by means of the chi-square test. In each case there was no significant differences between the two groups. (26, p. 12)

As a supplementary measure of socio-economic status, tabulation was made in the high school classes of the number of radio and television sets in pupils' homes. Again there was found to be no significant difference between the experimental and control groups with regard to the number of sets of each kind in the homes.

Intelligence Quotient

The Terman McNemar Test of Mental Ability was administered to the Grade IX groups, and the California Short-Form

Mental Maturity Test, Primary, was administered to the Grade II experimental and control spelling classes. As indicated in Table VII, application of the t-test for significant differences between groups indicated no significant differences in intelligence quotients in English and Spelling. There was a significant difference at the 5 per cent level of confidence, in favor of the experimental group in General Science. This difference was taken into account in interpreting the test results in General Science.

Age

A comparison of the ages of pupils in the experimental and control groups, using the chi-square test, showed that there was no significant difference in ages between the two groups in English, Composition, and Spelling. There was a significant difference at the 2 per cent level of confidence in the number of pupils of different ages in General Science. Thus, the fact that the control group was slightly older than the experimental group was another factor that was taken into consideration in interpreting achievement in General Science.

English Composition Tests

Form AM of the Greene-Stapp Language Abilities Test was administered to control and experimental groups on February 2 and 3, 1956. Form BM was administered on

TABLE VII

INTELLIGENCE QUOTIENTS, EXPERIMENTAL AND CONTROL GROUPS

<u>English Composition</u>		
<u>Experimental Group</u>	<u>Control Group</u>	
Mean - 111.557	Mean - 111.106	
S.D. - 12.110	S.D. - 12.180	
t = .3597		
P = .80 (not significant)		
<u>General Science</u>		
<u>Experimental Group</u>	<u>Control Group</u>	
Mean - 101.337	Mean - 98.341	
S.D. - 14.444	S.D. - 15.014	
t = 2.288		
P = .05 (significant)		
<u>Spelling</u>		
<u>Experimental Group</u>	<u>Control Group</u>	
Mean - 94.659	Mean - 92.377	
S.D. - 12.775	S.D. - 14.172	
t = 1.610		
P = .20 (not significant)		

June 7 and 8, 1956. Table VIII shows the number of students who took both tests, the means of the standard scores, and the standard deviations for pretests and post tests for both experimental and control groups. As indicated in the Table, there were no statistically significant differences between the two groups on either the pretest or post test. The t-test applied to the post test scores in the vocabulary test also showed no statistically significant differences between the experimental and control groups.

A third test of ability in English Composition was carried out by having both groups of students write a composition each in February and another in June. The papers were rated by a jury of five competent teachers. Ratings on student's compositions showed a slightly greater gain in the experimental group and a significant difference in favor of the control group on the first composition, with no significant difference between the two groups on the second composition.

Test Results in General Science

The Read General Science Test, Form AM, was administered to experimental and control groups on February 2 and 3, 1956, and Form BM on June 7 and 8, 1956. The results are shown in Table IX. According to t-test results, there was no significant difference between the experimental and control groups on the pretest. Post test means

TABLE VIII

GREENE-STAPP TEST OF LANGUAGE ABILITY

Pre-test		Post test	
Form AM		Form BM	
Experimental Group	Control Group	Experimental Group	Control Group
Number - 250	290	Number - 250	290
Mean - 106.380	107.200	Mean - 113.048	111.924
S. D. - 10.259	11.597	S. D. - 9.389	9.572
t = .872		t = 1.375	
P = .40 (not significant)		P = .20 (not significant)	

TABLE IX

READ GENERAL SCIENCE TEST

Pre-test		Post test	
Experimental Group	Control Group	Experimental Group	Control Group
Number - 243	239	Number - 243	239
Mean - 90.506	89.490	Mean - 99.235	96.720
S. D. - 11.301	11.084	S. D. - 10.629	13.209
t = 1.008		t = 2.301	
P = .40 (not significant)		P = .05 (significant)	

showed a gain of 8.729 in the experimental group as compared with a gain of 7.230 in the control group.

In order to determine whether the significantly greater mean score of the experimental group on the post test was a function of the somewhat higher intelligence of the group (2.996 greater I. Q.) and/or the somewhat younger age (two months younger), a further examination of the results was made. Since the mean I. Q. of the total group was 99.86, the post test scores of all pupils of I. Q. 100 and over in the two groups were compared by means of the t-test. Similar comparison was made of scores falling below 100 in I. Q. The results are given in Table X. As may be noted from the table, there were no significant differences between the mean test scores in either section of the comparison. The foregoing indicates that when I. Q. was controlled statistically by comparing those students within a relatively homogeneous range, no differences were found between experimental and control groups.

In order to determine the effect of difference in age in the two groups, post test scores of the younger experimental and control groups were compared (age thirteen and fourteen); similarly, scores of older students (age fifteen and older) were compared. When this was done, the t-test results indicated that there was no significant difference between scores in either of the two sections. It was, therefore assumed that there was no difference between the

two groups which could be considered a function of the two months difference in age.

TABLE X

Comparison of Read General Science Post Test Scores Made by Students Above and Below 100 I. Q. in Experimental and control Groups.

Scores of Pupils of I.Q. 100 and Above.		Scores of Pupils of I. Q. 99 and Below	
<u>Experimental Group</u>	<u>Control Group</u>	<u>Experimental Group</u>	<u>Control Group</u>
Number - 148	116	Number - 85	101
Mean - 103.432	101.655	Mean - 91.659	91.445
S. D. - 9.077	12.950	S. D. - 9.544	11.147
t = .141		t = 1.255	
P = .90 (not significant)		P = .30 (not significant)	

Spelling Test Results

The St. Louis Public Schools Diagnostic Spelling Test, Parts I and II, was administered to control and experimental groups during the week of February 1 - 8, and again during the week of June 4 - 8, 1956. Part I of the test is designed for the second and third grades; Part II for grades three through six. In order to measure upper levels of achievement it was decided to administer Part II as well as Part I. Each part consists of thirty-two words; scores are number of words correct. The results of the pre-test are given in Table XI.

The number of students shown in Table XI do not show the total enrolment in the groups. Instead, they indicate the number of students enrolled at the beginning of the term who were still enrolled at the close of the term. As indicated by the figures, the mobility of population was great.

TABLE XI
ST. LOUIS PUBLIC SCHOOLS DIAG-
NOSTIC SPELLING TEST: PRE-TEST

Part I		
	<u>Experimental Group</u>	<u>Control Group</u>
Number -	167	137
Mean -	7.425	7.942
S. D. -	5.677	5.515
	$t = .802$	
	$P = .50$ (not significant)	

Part II		
	<u>Experimental Group</u>	<u>Control Group</u>
Number -	161	140
Mean -	.814	1.164
S. D. -	1.569	1.566
	$t = 1.932$	
	$P = .10$ (not significant)	

As indicated in Table XI, a t-test comparison showed no significant difference between the control and experimental groups on the pre-test, Part I or Part II.

There was considerable shifting of school population in the course of the experiment as shown by the fact that of the 424 students given the pre-test in February, 1956, only 304 remained enrolled in June of that year, and of that number 215 remained enrolled in January, 1957, at the close of the second semester when the experiment ended. Thus the number of pupils whose achievement could be measured during the entire two-semester period decreased markedly.

Table XII shows the pre-test scores of pupils in the original group who were still enrolled at the end of the second semester. The results showed a significant difference between the two groups in favor of the control group. Mean post test scores showed a similar difference between the two groups.

A comparison of the mean I. Q. of the two groups of pupils who had been in the experiment throughout revealed that the mean I. Q. of pupils of the experimental group was 94.215. The t-ratio was .047 (p. 90) It was therefore taken as established that there was no significant difference in mental ability of the two groups as measured by I. Q. scores, and it was assumed that the difference in achievement on pre-test scores was due to chance variations in sampling as changes occurred in population during the experiment.

TABLE XII

ST. LOUIS PUBLIC SCHOOLS
DIAGNOSTIC SPELLING TEST

Pre-test			
Part I		Part II	
Experimental Group	Control Group	Experimental Group	Control Group
Number - 117	98	Number - 116	95
Mean - 6.718	8.449	Mean - .690	1.379
S. D. - 5.652	5.417	S. D. - 1.760	2.546
t = 2.289		t = 2.237	
P = .05 (significant)		P = .05 (significant)	
Post Test			
Part III		Part IV	
Experimental Group	Control Group	Experimental Group	Control Group
Number - 120	97	Number - 120	97
Mean - 18.683	21.536	Mean - 5.317	9.567
S. D. - 8.768	9.112	S. D. - 6.513	8.159
t = 2.332		t = 4.118	
P = .05 (significant)		P = .01 (significant)	

A comparison was then made between the mean individual gains in spelling test scores of pupils in both groups who were enrolled throughout the entire experiment. The results

are given in Table XIII of this report. It indicates that there was no significant difference between the two groups on Part I of the test. On Part II, however, the control group made a significantly higher gain than the experimental group at the .01 level of confidence.

Explanation for this difference in performance on the two parts of the test, as measured by mean individual pupil gains, may lie in the fact that large-group television teaching must of necessity be geared to one level of instruction. As indicated in the summary of teachers' comments, both television and supervising teachers cited as a serious disadvantage of total teaching by television the fact that it is impossible for the television teacher to meet the needs of all pupils. They believed that under such circumstances, the interest of the superior child cannot be challenged and the slower child does not get the help he needs. The greater mean gain of individual pupils in the control group on Part II would appear to indicate that normal classroom instruction resulted in greater learning of words above the level of grade placement of the group (second grade) than was true of the experimental group.
(26, p. 60)

The results in spelling may be summarized as follows:

1. There was no significant difference between mean gains of experimental and control groups on that part of the test designed for second grade pupils.

2. The control group made a significantly greater gain than the experimental group on Part II of the test which is intended to measure the spelling ability of pupils beyond the second grade level.

TABLE XIII

St. Louis Public School Diagnostic Spelling Test Mean Individual Gains in Scores of Those Pupils Enrolled in February, 1956, and in January, 1957.

Part I		Part II	
<u>Experimental Group</u>	<u>Control Group</u>	<u>Experimental Group</u>	<u>Control Group</u>
Number - 118	97	Number - 117	94
Mean - 11.992	13.289	Mean - 4.521	8.160
S. D. - 6.609	7.144	S. D. - 6.013	7.241
t = 1.370		t = 3.909	
P = .20		P = .01	

Subjective Evaluations

Dr. Mark Shinnerer, Superintendent of metropolitan Cleveland public schools, was asked to observe and evaluate the experiment. Some of the points made by Dr. Shinnerer in his report follow: (26, pp. 29-31)

1. With reference to the possibility of using TV to alleviate the teacher shortage, Dr. Shinnerer suggested that while it may have "a mission to perform on the basis of temporary substitution for

some of the teachers who do not exist, I will not admit, at the moment, that this device is a replacement for teachers. (26, p. 30)

2. The experiment seemed to demonstrate that TV is more useful in some fields than in others. For example, it seemed to be an excellent medium in science; it was not as effective in ninth grade composition. A suggested explanation was that there are not enough possible visuals in composition.
3. "The only advantage which TV has over radio is in visuals, and if they are not used very much, why use TV?" (26, p. 30)
4. There was considerable inattentiveness on the part of pupils. In this connection, Dr. Shinnerer suggested that it is perhaps not to be expected that pupils will give complete attention for a full thirty minutes.
5. In a class of 150, with all the instruction coming over TV, there is no one to pick up those who fall behind or who need special attention.

Student Reaction Schedule

A student questionnaire was answered by students in the Grade IX Science and Composition classes. A copy of the questionnaire is given in Appendix "A".

Analysis of the questionnaires show that 33.9% of the students thought that they had learned more by television than would have been learned in the regular classroom;

17.3% thought that they had learned about the same amount; and 48.8% believed that they had learned less. The corresponding percentages for Composition were 17.2%, 17.1% and 65.7%.

The principal reason given by those who thought that they had learned more was that television offered a much greater variety of materials and experiences than they would find in the regular classroom. The chief reason given by those who took the opposite view was that there had been no opportunity to ask questions and participate in group discussions and personal conferences with the teacher.

In regard to a comparison of the degree of interest in the two types of lesson, 43.5% of the pupils thought that the TV teaching was more interesting; 11.9% thought it equally interesting; and 44.6% thought it was less interesting than ordinary classroom instruction. Corresponding percentages for Composition were 22%, 10% and 68% respectively.

Among principal advantages of television teaching listed by students were the following:

1. The opportunity to see experiments and use materials not available in the regular classroom.
2. The opportunity for the best teachers to teach more students.
3. The fact that it was necessary to concentrate and listen closely.

4. The fact that it was possible to watch the lesson at home if the student was absent from school.

Among the principal disadvantages listed by students were the following:

1. The impossibility of asking questions directly or conferring with the teacher about the work.
2. Uncomfortable physical conditions in the receiving rooms.

In regard to the degree to which students missed being able to take part in class discussions, 46.6% answered that they missed it a great deal; 38.6% a little; and 15.0% not at all. For Composition the percentages given in the same order were 62.9%, 25.0% and 12.1%.

Of the students who thought that they paid closer attention, about the same attention, or less attention to the television lessons as compared with regular lessons, the respective percentages were 29.5%, 23.9%, and 46.6% for Science, and 17.9%, 11.8%, and 70.3% for Composition.

In Science, 66.6% of the students stated that they felt that they knew their television teacher better, 28.6% stated that they felt that they knew her equally as well, and the remaining 4.8% better than in the regular classroom situation. The percentages for Composition given in the same order were 80.7%, 17.2%, and 2.1%.

Although space was provided at the end of the questionnaire, few, if any, new ideas were presented.

Subjective Evaluation of the Television Teachers

The television teacher of the General Science course indicated that television can compensate for the lack of adequate facilities and equipment which exists in most General Science laboratories; that intricate details can be shown better on the screen than on a lecture desk; and that interesting and important people can make their contributions to many students in an economical manner. Among the disadvantages listed were the impossibility of discussion between teacher and pupil; the fact that the wide range of abilities in large Grade IX classes make the presentation at the high average level too difficult for many and non-stimulating for others; and that teacher assistants were not well enough trained to do a satisfactory job of grading papers. He also stated that all concepts do not lend themselves easily to presentation by television, and gave as an example the study of color.

The Composition teacher also mentioned the difficulty in securing accurate ratings from untrained teachers in the marking of Composition papers. She also felt that the absence of an intimate teacher-pupil relationship was a serious disadvantage. A technical difficulty was the impossibility of projecting samples of student writing for analysis and comment. She believed that the use of visuals possible on television gave her an advantage which the classroom teacher did not have to the same degree.

The spelling TV teacher listed as disadvantages the lack of the normal give and take of the regular classrooms; the middle of the road presentation of material which did not challenge the bright student nor meet the needs of the slow. She stressed the value of the daily feedbacks which helped her to learn something about the children as individuals, and to use this knowledge in her lessons.

Subjective Evaluation of the Supervising Teachers

Principal advantages listed were:

1. Experiments and visual materials are more clearly seen on the screen than in the classroom, and it is possible to use materials that are not available to the classroom teacher. TV also offers a ready and convenient means of presenting educational films.
2. Superior students are stimulated to do more original work.

Disadvantages Listed by Supervising Teachers

1. The difficulty of providing adequately for pupils of varying ability without boring the bright and confusing the slow.
2. The inability of students to ask questions as they occurred.
3. The difficulty of providing satisfactory physical conditions in the case of very large viewing groups.
4. The suggestion was made that pupils learn more by handling equipment than by watching someone else handle it.

5. In large classes, it is impossible to use dictionaries and other reference material normally available in the regular classroom.
6. The twenty-minute spelling lesson, coming as it did near the end of the day, seemed too long for the Grade II pupils.
7. It is difficult to determine whether pupils understand the concepts involved in a lesson or if they are paying attention. Although no major discipline problems arose, it was necessary for supervising teachers to exercise strict control.

Statements from Principals

Following are selected comments of principals from those listed in the report: (26, p. 40)

1. "The group seemed too large - would like to have the same number divided into two or three smaller units in separate smaller rooms."
2. "Principal criticism is the lack of personal contact between teacher and class, the essential spark that keeps the class alive."
3. "The lecture type of teaching would lend itself better to older students and perhaps to certain subjects such as history and others requiring much reading."
4. "The assigning of grades by TV teachers entirely on the basis of written work omits the normal teacher evaluation of a student in terms of classroom participation. This does not seem adequate to me."
5. "Another difficulty was that of teaching to the assumed level without being able to skip over something that the class was obviously familiar with - individual differences cannot be provided for."

6. "I still maintain that good teaching is a prime requisite, and the medium is secondary. Poor teachers will do poor work in any medium, and conversely, good teachers would do a creditable job under many conditions and with various methods of instruction."

Conclusions

Under the conditions of the experiment it was found that, as measured by the testing instruments employed, students in large group television classes in ninth grade English Composition and ninth grade General Science showed a degree of achievement at least equal to that of control classes taught in the conventional manner. It was recognized that this was only a partial answer (to the first problem posed in the list of objectives) for effective teaching involves intangibles which are not capable of being measured by objective tests. (26, p. 44)

Although student achievement, as indicated by standard tests, was satisfactory, the weight of evidence was much too small to determine whether television instruction could be used to so modify the traditional pattern of classroom instruction that an entirely new concept of teaching personnel may be developed. The report suggests the need of further experimentation in classrooms constructed with a view to meeting the needs of large-group classes. (26, p. 45)

The report also stated that while the teacher assistants in Spelling, who were retired elementary teachers, did

a satisfactory piece of work, the teachers assistants in the high school classes were inadequate. Their background and training did not make it possible for them to exercise the judgment necessary for valid marking of the papers and successful contacts with the students. It was evident that the function of the teacher assistant was more than that of a clerk.

In regard to the reaction of students and teachers to large group television teaching, it is to be remembered that the evidence presented was subjective in nature; it represented expression of opinion in letters from teachers and principals and on questionnaires by students. Teachers listed both advantages and disadvantages. They commented most often on the freedom and flexibility of the medium in presenting material; the main disadvantages mentioned centered around the problem of meeting the needs of students of varying abilities, and the unsatisfactory physical conditions under which the large-group instruction was given. For the most part, opinions of principals were the same as those of the teachers.

Students on the whole did not react favorably to the program. Over half of the pupils thought that they would have learned more in a regular classroom than they did in the television course, although, as indicated by achievement tests, their gain in achievement was equal to that of control classes. Many of them thought the TV classes

less interesting than regular classes and indicated that they missed not being able to take part in class discussions or ask questions directly of the teacher.

The report concludes by stating that much further experimentation is needed to get the answers to the problems posed in the list of objectives, and that such further experimentation should be concerned "with the problem of student acceptance, with the problem of how to meet the needs of students of varying abilities, with ways of best utilizing the potential of television in achieving the purposes of instruction, and with the problems relating to physical conditions in large classrooms. (26, p. 46)

CANADIAN EXPERIMENTATION IN THE USE OF
TELEVISION FOR CLASSROOM INSTRUCTION

Introduction

The First Canadian Experimentation

The first venture into the use of television as an instrument of classroom instruction in Canada was undertaken on a national scale in the fall of 1954. An earlier project had been undertaken in March, 1954, when four open circuit programs were televised for home viewing by school children with the aim of supplementing the Canadian School Broadcasts. This experiment is described in a pamphlet issued by the CBC in 1954. (34) However, as it did not involve direct classroom instruction, it is not further considered in this report.

Sponsorship

The National Advisory Council on School Broadcasting with the co-operation of the CBC, conducted the initial experiment in Canada in the use of television for classroom instruction. The experiment was carried out in November, 1954; results of the experiment are set forth in a report entitled "Television in the Classroom" published by the CBC in 1955. (46)

Purpose

The purpose of the experiment "was similar to that of experiments in the United States and Great Britain, namely, to determine whether, and to what extent, television could help the teacher in her daily classroom work." (46, p. 9)

The Programs

Four open circuit programs were presented at the Grade V and VI level on the topics, "How Columbus Navigated", "Look Alert-Stay Unhurt", "Surface Patterns" (art), and "Starbuck Valley Winter" (literature). Four programs of the open circuit type were also presented at the Grade VII and VIII level on the topics, "House of History", "Iron From the North", "Save Our Soil", and "Current Events".

Some Features of the 1954 Experiment (46, pp. 11-14)

1. Each program was presented on kinescope film. The reason for so doing was that this was the only way in which the experiment could be extended on a uniform basis to all television areas in Canada. Although southern Ontario and Quebec could have the programs "live", it was agreed that it was better to use a uniform procedure throughout, even though this involved some loss in quality of picture and sound.
2. The Television Committee recommended:
 - (a) That the programs be presented to normal classes in their regular classrooms so that teachers would be using the programs under normal conditions. That this procedure was carried out by all but a few classrooms is borne out by the report.

(46, p. 44)

3. A Teachers' Manual was prepared by the CBC to help teachers make the best use of the telecasts. It gave detailed information about the content of each program, and gave advice on introductory and follow-up activities that might be used.
4. Evaluation was secured through questionnaires submitted to teachers supplemented by the opinions of leading educationists. Thus evaluation was entirely subjective. There was no attempt made to compare the relative effectiveness of teaching with and without the use of television as a supplementary aid. Altogether, 513 teachers from 205 schools returned 2,425 evaluation forms.
5. Approximately 200 schools took part in the experiment. Of these, seventy-eight used equipment loaned to them by the Radio and Manufacturer's Association of Canada. The remainder secured equipment on their own initiative.

Findings Based on Questionnaire Results

1. General Teaching Value of the Programs.
 - (a) 32% of the teachers rated this as high.
 - (b) 62% rated it as medium.
 - (c) 6% rated it as low.
2. Suggestions for Future Classroom Use of Television.
 - (a) 28% of the teachers requested it on a regular schedule.

- (b) 65% asked for further experimentation.
- (c) 7% said that the telecasts should be dropped.

3. Suggestions Made for the Improvement of School Telecasts.

- (a) Programs should be closely related to the curriculum, and should present material that the teacher cannot easily duplicate.
- (b) Careful planning in close consultation with teachers is required.
- (c) Presentation.
 - (1) There should be more lessons by master teachers.
 - (2) There should be greater provision for class participation.
 - (3) There should be more dramatization of suitable material.
- (d) The minimum length of the television program should be twenty minutes, with longer lessons where necessary.
- (e) Fidelity of voice production is essential, and thus kinescope should be avoided.
- (f) Visuals such as models, maps, etc., should be large, shown at length, and with greater use of close-up shots.

4. Value of Program Aids.

- (a) The notes on aims and content of each program

contained in the Teacher's Manual were rated as excellent by 40% of the teachers; almost 60% rated them as good.

- (b) Of the suggestions in the Manual for preparatory and follow-up work, 20% of the teachers rated them as excellent, 75% as good, and the remainder as poor.

Some suggested that they could have been improved by making them longer and including questions to be answered by pupils after the programs.

5. Preliminary Program Warning (46, p. 43)

A standard oneminute filmed opening of visuals and music preceded each telecast, warning teachers to adjust the volume of their sets. One-third of the teachers rated this warning as excellent, three-fifths as good, and not quite one-tenth as poor.

6. Suggested Improvements in Viewing Conditions

- (a) Elevation of the TV set well above the eye level of pupils.
- (b) Limiting the number of pupils viewing the program in a room to one class.
- (c) Viewing of programs in classrooms rather than in auditoriums.
- (d) Use of TV sets with at least 21-inch screens.
- (e) Use of TV sets with speakers at the front rather than at the side.

7. Problems Stressed by Teachers.
 - (a) The problem of having to alter the order of the curriculum studies to make them fit in with some of the telecasts. In this connection, it was suggested that programs should be planned to correlate closely with the curriculum, and should be presented at the right time of the year.
 - (b) Preparation of the class, the viewing of programs, and follow-up work used up too much time. (46, pp. 41-45)
8. Teachers generally placed a high value on the careful and frequent use of visuals such as maps, charts, models, and others. "Television is basically a visual medium, therefore the development of a topic must be as visual as possible." (46, p. 52)
9. In regard to the subjects themselves and the mode of presentation on the telecasts, teachers generally agreed on the following:
 - (a) Social Studies - certain historical events can be quite effectively presented in dramatized form over television.
 - (b) Art - Many teachers felt that the program was a help in teaching a difficult topic. On the other hand, the absence of color imposed a

definite limitation in the teaching of this subject.

(c) In general, it was felt that the one program in literature had achieved its purpose of stimulating interest in reading.

(d) Science - It was believed that the use of demonstrations and experiments as used on the telecast can be a valuable aid in the teaching of Science.

10. In the few schools where the TV set had been placed in an auditorium, the consensus of opinion was that this was a mistake, and that the viewing should be done in a classroom.

11. The report emphasizes that films and telecasts are to be considered complementary rather than rival agencies.

However, it does go on to say that:

"the visual and aural qualities of sound films are, at present, superior to those of telecasts. This is partly because films are projected on larger-sized screens, and partly because telecasts, when shown (as in the experiment) over a network of stations not connected by line, have to be presented on kinescope, which entails some loss of quality. Such loss is particularly noticeable whenever kinescope includes film inserts. However, constant improvements are being made to the kinescoping process, and the quality of future kinescopes of school telecasts is likely to be much more satisfactory." (46, pp. 50 - 51)

General Conclusions

"In general, the results of this experiment bear out those of similar experiments in Britain, and the United States. They indicate

that television programs jointly planned and executed by teachers and broadcasters have a definite contribution to make as a teaching aid. However, further experimentation will be required to clarify the precise nature and extent of this contribution." (46, p. 50)

National Advisory Council Recommendations

Following the 1954 experiments, the National Advisory Council on School Broadcasting made the following recommendations:

1. That further experiment into the classroom use of television be undertaken by the CBC in co-operation with the National Advisory Council on School Broadcasting. Such an experiment should be conducted on a national basis with costs borne by the CBC. It should aim at clarifying the nature and extent of the contribution to be made by television in the classroom.
2. That in such an experiment attention be given:
 - (a) To grade levels of students not provided for in this experiment.
 - (b) To further experimentation in the areas of social studies (especially current events) and science, which are indicated in the present experiment as having the greatest potential.
3. That such experiments again be accompanied by the preparation of a detailed and illustrated manual to

assist teachers to make most effective use of the programs.

4. That for this second experiment, the programs be produced "live" for the microwave network where possible, and released by kinescope on a delayed basis for stations in other areas.
5. That in view of the success of the productions of the National Film Board in the present experiment, consideration be given to enlisting their co-operation in a second experiment.
6. That in the preliminary planning of experimental school television programs, the National Advisory Council seek to obtain, as far as is practicable, the assistance of classroom teachers from all areas affected by the experiment.
7. That special attention be given to ensuring that content be limited to student capacity, and to the more effective adjustment of the use of visuals to classroom needs.
8. That whenever possible television programs be viewed in a classroom rather than in an auditorium, and that television receivers with at least a 21-inch screen be used.
9. That in view of the fact that experiments with television for schools may lead educational authorities to request establishment of a regular service of

national school telecasts, the CBC is requested to keep this possibility in mind and to ensure sufficient flexibility in programming to make it possible to put into effect any future recommendations of this kind that the Council may decide to make. (46, pp. 32 - 33)

The foregoing recommendations of the Advisory Council were followed very closely in the next major Canadian experiment carried out in April - May, 1956.

A SECOND EXPERIMENT AT THE NATIONAL LEVEL

Introduction

Purpose

In line with the recommendations of the National Advisory Council made in 1954, a second Canadian experiment on the national level was undertaken in April and May of 1956.

"The main purpose of this experiment was to investigate the use of television for those students, and in those curriculum subjects not covered by the previous experiment. A second aim was to explore further the relationship between instructional films and educational telecasts used as classroom aids." (43, p. 7)

The Television Programs

The program consisted of fifteen television presentations divided between the three grade levels as follows:

Grades II-IV: Three of ten and three of twenty minutes duration.

Grades V-VI: Three of ten and three of twenty minutes duration.

Grades VII-IX: Three thirty-minute presentations.

The ten minute programs were planned in continuous series of three each. All other programs were planned as separate units. The series of ten minute programs for Grades V and VI were prepared in advance on film. Of the remaining telecasts, six were produced "live" and six on kinescope in CBC television studios. Three of the twelve originated from Winnipeg, one from Ottawa, and eight from

Toronto. The schedule of telecasts, together with topics, and time allotments, is shown in detail in Table XIV.

Presentation of the Programs

The Council purposely kept the type of teaching presentation as widely varied as possible. The final selection included the following:

1. Direct teaching by a "master teacher".
2. Complete dramatization.
3. A combination of dramatization with direct teaching.
4. The use of fantasy and cartooning were included among the techniques of presentation. Professional script writers and professional actors were used for the dramatized programs.

The fifteen programs were presented over twenty-three privately owned stations and six CBC stations. The network was made up of twenty-eight English speaking stations, and one French language station. (43, p. 8)

The Teachers' Manual

The Council published a thirty-six-page manual similar to that used in the 1954 experiment which gave suggestions for preparatory and follow-up activities. Its unique feature was the inclusion of short retention tests prepared for most of the programs.

Number of Students, and Schools Involved in the Program

There were 62,450 students drawn from 1,841 classes in 721 schools viewing the programs.

TABLE XIV

SCHEDULE OF TELECASTS
(April 16 to May 14 Inclusive)

TUESDAY Grades II - IV	THURSDAY Grades V - VI	FRIDAY Grades VII - IX
1. Adventures in Speech (series-ten minutes) 2. How Does Your Garden Grow. (Science - twenty minutes)	1. Maps for You. (S.S.) (Series ten minutes) 2. Visiting the Moon (Science-twenty minutes)	1. Design in Every Day Life. (Art-thirty minutes).
Second Week		
1. Adventures in Speech (Series-ten minutes) 2. The Store Around the Corner (Social Studies Series - twenty minutes)	1. Maps for You. (Social Studies Series - ten minutes) 2. How the Telephone Works. (Science - twenty minutes)	From Gunpowder to Horsepower. (Science - ten minutes)
Third Week		
1. Adventures in Speech (Series-ten minutes) 2. Travels of Gary Goose. (Science - twenty minutes)	1. Maps for You. (Social Studies Series - ten Minutes) 2. Fur For a Hat. (Social Studies-twenty minutes)	Birth of Confederation (Social Studies - thirty minutes)
Time Summary		
Social Studies - 6 programs - total time 100 minutes.		
Art - 1 program - total time 30 minutes.		
Science - 5 programs - total time 110 minutes		
Language - 3 programs - total time 30 minutes.		

General Method of Evaluation of Programs

As in the 1954 experiment, evaluation was secured on the basis of teacher responses to questionnaires. There was provision made for original comment. The number of teachers returning evaluation forms for each program is shown in Table XV.

Findings Based Upon Analysis of Questionnaires

Value of School Telecasts as a Teaching Aid

The percentage of teachers rating the value of the telecasts as high, medium, or low is shown in the following table:

<u>Grades II - IV</u>	<u>Grades V - VI</u>	<u>Grades VII - IX</u>
High.....28%	High.....20%	High.....20%
Medium....57%	Medium...67%	Medium....60%
Low.....15%	Low.....13%	Low.....20%

The Future of Classroom Television

The attitude of teachers toward the use of television in the future is indicated in the following table:

<u>Percentage Favoring</u>	<u>Grades II-IV</u>	<u>V-VI</u>	<u>VII-IX</u>
Regular schedule of telecasts	35%	22%	19%
Further experimentation	58%	69%	70%
No further school television	7%	9%	11%

Suggestions for School Telecasts

Teachers were asked to list in order the areas in which they felt that television could make the greatest contribution. Social Studies and Science headed the list in that

TABLE XV
 The Number of Teachers Returning
 Evaluation Forms For Each Program

Program	Number of Teachers Who Returned Evaluation Forms
1. Adventures in Speech.....	711
2. How Does Your Garden Grow.....	753
3. The Store Around The Corner.....	766
4. The Travels of Gary Goose.....	772
5. Maps For You.....	686
6. Visiting the Moon.....	782
7. How The Telephone Works.....	710
8. Fur For a Hat.....	707
9. Design For Everyday Things	552
10. From Gunpowder to Horsepower.....	542
11. The Birth of Confederation.....	545

order. The complete list showing the order by grades is given in Table XVI.

Comparison of Television and Radio
in the Adventures in Speech Series

"Of the teachers who had used both media, 72% said that the television series was more effective than the comparable radio series; 20% rated the TV and the radio series as equally effective; 8% favored radio over television." (43, p. 10)

"Teachers who considered the telecasts to be superior to radio broadcasts for speech training gave as their reasons: That pupils could see the actual lip movements and thus imitate them more accurately; that the TV picture helped to hold attention at a higher level than sound alone; that the teacher's personality made a much stronger impression since children could see her." (43, p. 10)

Suggestions For Improving School Telecasts

Among the suggestions recurring most frequently were the following:

1. Programs should be more closely related to the programmes of studies. They should cover no more than the work of two grades so that they would better suit the maturity of viewers. They should contain a limited amount of material which should be carefully taught with emphasis placed on the main points through repetition and summaries. Vocabulary should be carefully graded. Clarity and rate of speech should receive special attention. Accents should be avoided. (43, p. 35)
2. Visuals (models, objects, maps, etc.) should be large. They should be shown in closeup, and should be retained on the screen long enough for satisfactory viewing.

Care should be taken to prevent them from blending with the background.

TABLE XVI

Teachers were asked to list in order the areas in which they felt that television could make the greatest contribution. Topics are shown in order of frequency of mention.

<u>Grades II - IV</u>	<u>Grades V - VI</u>	<u>Grades VII - IX</u>
Social Studies	Social Studies	Social Studies
Science	Science	Science
Nature Study	Health & Safety	Art
Speech Training	Nature Study	English
Health & Safety	Art	Health
Literature	Literature	Current Events
Music	Music	Music
Art		

3. Although approximately 95% of the teachers had rated the Teachers' Manual as valuable and had placed a similar high rating on the activities which it contained, there were a number of suggestions for making it still more effective:
- (a) That it should be distributed very early in the year.

- (b) That it should be more detailed in the guidance given in regard to presentation and program content.
- (c) That it should carry vocabulary lists and words of songs.
- (d) That it should contain pictures, maps, and diagrams related to the program.

Conclusions

1. In the opinion of the great majority of teachers, television has definite value as a teaching aid. This is borne out by the fact that over 80% of the teachers polled, rated its value as "medium" or "high".
2. The experiment revealed a need to link television programs more closely to the curriculum of individual provinces.
3. Teacher participation in planning programs is essential.
4. Keeping in mind the stress placed on closer correlation of telecasts with provincial curricula, the need for further exploration at the provincial level is indicated.
5. A variety of techniques of presentation were used, and all were generally successful. Seven programs made use of the master teacher technique; one of the seven also made use of a cartoonist; eight programs were presented in completely dramatized form. Fantasy was used in one. From the success of the foregoing, it would seem that

there is no one best method of presentation, but that it varies with the lesson to be taught.

6. The plan of presenting programs in series form proved successful and popular among teachers. In the case of the "Adventures in Speech" program, 67% of the teachers favored an extended series of the same duration - ten minutes.
 7. Teaching content of the programs was generally satisfactory as shown by the fact that over 74% of the teachers who reported expressed satisfaction with it.
 8. The attempt to explore further the relationship between instructional films, and educational telecasts used as classroom aids was not successful. Few teachers had used films closely related to the topics on the telecasts. It was obvious also that many of those reporting were actually referring to films that were not relevant. Accordingly, no valid conclusions can be reached on the basis of the replies received. The report does suggest that attention might profitably be given to the use of television as a means of securing rapid distribution of suitable films, and film strips to the classroom or for presenting "master teacher" types of school telecasts built around films or film strips. (43, pp. 38-39)
- The whole matter of the relationship between films and telecasts calls for further investigation.

Recommendations of the National Advisory Council

On the basis of the results of the 1956 experiment, the National Advisory Council on School Broadcasting made the following recommendations among others:

1. Since the two experiments have proven that school television has a definite contribution to make as a classroom teaching aid, the National Advisory Council should be prepared to recommend to the CBC that it should give favorable consideration to requests from one or more provinces for the institution of provincial, regional, or national series of programs as soon as satisfactory arrangements can be made.
2. While the reports received from teachers in the two national experiments have indicated general satisfaction with the degree of correlation of content of the programs with the curriculum, a substantial proportion of these reports also indicates a desire for programs more closely related to provincial courses of study. Therefore, it is recommended that further experimentation should take place along these lines at the provincial or inter-provincial level. (43, pp. 22-23)

THE MANITOBA EXPERIMENT

The First Provincial Experiment, February-March, 1958.

Purpose

The general aim of the experimentation in Manitoba is given in part as follows in Manitoba School Television.

(1, p. 4)

What the programs will do if they are successful is give students additional motivation - create interest in the subject and strengthen the desire to learn without which the best teacher's best efforts may be fruitless.

One of the objects of the experiment is to discover, not only what techniques are most useful in school television, but also what subjects gain most from the use of TV.

A further objective was to design lessons that would be closely linked with the Manitoba curriculum. This was in accordance with Recommendation No. 2 of the National Council on School Broadcasting. (43, p. 23)

Program Content

Six lessons were presented via open-circuit television with one lesson in each of Biology, Chemistry, Physics, Natural Science, and Handicrafts. Topics and scheduling are shown in Table XVII. Science was given prominence because

"the successful presentation of scientific material depends heavily upon visual observation, and this quality makes Science particularly suitable for television." (1, p. 4)

Throughout the experiment, the programs were designed to follow the provincial curriculum closely.

TABLE XVII
SCHEDULE OF TELECASTS

<u>Date of Presentation</u>	<u>Grade</u>	<u>Subject</u>	<u>Topic</u>
February 25	XI	Chemistry	Carbon Dioxide
February 26	XI	Biology	The Unseen World (Bacteria)
March 4	XI	Physics	Force & Pressure in Liquids
March 6	7, 8, 9	Arts and Crafts	Patterns Everywhere
March 11	7, 8, 9	Natural Science	Locomotion in Birds & Animals
March 13	7, 8, 9	Literature	The English Theatre

The telecasts were repeated over Station CKX-TV, Brandon, one week later.

Sponsorship

The Manitoba Experiment was under the joint sponsorship of the Manitoba Department of Education and the CBC. All of the planning and much of the preparation of the programs was done by the School Broadcasts Branch of the Manitoba Department of Education, while the actual production and broadcasting were done by the CBC.

Evaluation

Evaluation was subjective, being based on teacher opinion as expressed through the medium of questionnaires.

Extent of Participation

Six hundred and thirty-one teachers reported from 117 schools in eighty different centres throughout the province. The number of students participating in the experiment was 18,301.

Summary of Teacher Comments By Subject

Chemistry

The lesson on carbon dioxide was generally well received. The majority of teachers commented favorably upon the background information. Almost half of the teachers reporting stated that the program had pointed up the great need for more and better equipment in their schools. The general opinion was that the experiments had proven to be the most interesting part of the program from the viewpoint of the students.

Suggestions directed toward improvement of future programs were:

1. The background had detracted from the lesson because it was too cluttered or because it was too distracting.
2. More movement on the part of the teacher would have been helpful.
3. Some narration to accompany the opening montage of the film would have improved this part of the program.

Biology

Teachers considered the content of the program generally satisfactory. The use of exceptionally fine apparatus and equipment came in for favorable comment. The specimens, apparatus, and film inserts received favorable mention from the majority of teachers. The interview technique was considered good.

The principle suggestion for future improvement was that the interview technique required experienced participants.

Physics

The experiments performed and the apparatus used were considered to have been of especial interest and value. The introduction of pupils to much fine equipment, some of which could not have been found in even the finest school labs, was considered to be of much value. The close-ups were generally considered to be good. A strong point brought out in the teachers' commentaries was that the telecast made it possible for every student to see clearly what was taking place.

It was suggested that care should be taken to see that the lab table should not be so congested in future.

Natural Science

As indicated in Table XVIII, this program had the second greatest number of viewers. The films, specimens,

and animated graphics were received with enthusiasm by both teachers and pupils.

TABLE XVIII
AUDIENCE REPORTING TABLE BY SUBJECT

<u>Audience Reporting</u>	<u>Chem-istry</u>	<u>Biol-ogy</u>	<u>Physics</u>	<u>Natural Science</u>	<u>Liter-ature</u>	<u>Art</u>
Reports received	139	59	96	119	130	88
Schools represented	99	39	70	76	82	62
Number of Pupils	3,372	1,450	1,760	4,031	5,041	2,647
Grand Total Number of Pupils in the entire program-18,301.						

English Literature

The Literature presentation on the Elizabethan Theatre was considered to be the outstanding program of the whole series. Presentation, planning, and content received general approval from teachers. The dramatic scenes were considered outstanding.

Arts and Crafts

The demonstration of techniques came in for much favorable comment.

The participation break came in for criticism on the ground that it was a distraction, and that student activity should have been left until after the program.

Findings

1. The co-operation of the two television stations at Winnipeg and Brandon made it possible to make the programs available over a very large area. The fact that such a large percentage of schools did in fact make use of the programs is indicative of considerable interest in the possible use of television for classroom instruction.
2. As shown in Table XIX , ratings by teachers indicated that pupils showed the greatest interest in the Literature lesson, followed by Chemistry, Natural Science Physics, and Biology in that order. The overall results , as indicated in the same Table suggest that general interest of students in the television lessons had been high.
3. Teacher opinion as to the degree to which pupil interest had been sustained in the lessons is also given in Table XIX with the order by subjects being the same as in the preceding. Consideration of the overall statistics indicated that , in the opinion of the teachers involved in the experiment, interest had been generally well sustained throughout the lessons.
4. The objectives of the lessons were realized to a satisfactory extent as revealed in Table XIX.

TABLE XIX
ANALYSIS OF TEACHER REPORTS
OF STUDENT REACTION TO PROGRAMS

Percentages indicate the percentage of Reporting teachers giving each rating.

Degree of Student Interest	Chem-istry	Biol-ogy	Physics	Science	Litera-ture	Art
Very interested.....	68%	33%	49%	59%	84%	63%
Moderately interested.....	30%	55%	49%	38%	15%	24%
Indifferently interested.....	2%	12%	2%	3%	1%	3%
<u>Was Interest Sustained?</u>						
Yes.....	93%	58%	81%	89%	94%	88%
No	7%	42%	19%	11%	6%	12%
<u>Were the Objectives of the Lessons Achieved?</u>						
Yes.....	74%	44%	71%	78%	93%	-
Partly.....	26%	50%	28%	-	7%	-
No.....	-	6%	1%	22%	-	-

5. Picture and sound reception were both remarkably good as indicated in Table XX.
6. Literature was the most popular, and biology the least popular lesson in the program.
7. The introduction of pupils to much fine equipment not to be found in the average laboratory, or in some cases

- in any lab was considered to be of great interest and value.
8. Students were able to get a better view of equipment and of the details of the experiments carried out in the Science classes than they could have done in the ordinary classroom.
 9. Examination of the summary of comments made by teachers on the presentations revealed the fact that many of the weaknesses in presentation could readily be eliminated in future programming.
 10. The "Master Teacher" plan worked well in Science teaching. The dramatized portions were the most effective part of the Literature program.
 11. The experiment showed that it was possible, with the co-operation of the CBC, to produce good programs at comparatively small cost.

Conclusions

1. The success of the two techniques of presentation used suggest that there is no one best method of presentation for all types of lessons. In the Manitoba Experiment, it was found that the teaching of Science could be effectively done using the "Master Teacher" plan. The Literature lesson made effective use of the technique of dramatic presentation of material. In regard to techniques of presentation, School Television is quoted as follows: (1, p. 20)

TABLE XX

Ratings on the Quality of Television Reception Throughout the Province. The Percentages Indicate the Number of Reporting Teachers Giving Each Rating

<u>Picture Quality</u>	<u>Sound Quality</u>
Good - 83.3%	Good - 90.8%
Fair - 13.5%	Fair - 9.2%
Poor - 3.2%	

- "School telecasts should probably employ: (a) Master teachers demonstrating lessons with help of all modern techniques such as films, models, diagrams, etc., (b) dramatizations with professionals." (1, p.20)
2. Educational television can serve a useful purpose in rural as well as urban centres.
 3. The extent and quality of the evaluations made suggest that there is wide interest in the use of television in the classroom, and that some teachers are prepared to make use of it.
 4. As experience is gained in educational television, it should be possible to extend the scope of the programs, to improve their quality, and to fit them more closely to the needs of the school curriculum.
 5. "Perhaps eventually a video tape service will be feasible, and programs may be repeated either over the air or in individual classrooms." (1, p. 20)
 6. Teacher consultants or committees appear to be essential even when professional script writers are used.

THE HALIFAX EXPERIMENT, JANUARY, 1958

Introduction

Aims of the Experiment

Among the aims listed in the report published by the Board of School Commissioners for the City of Halifax are the following:

1. To present a series of television lessons under the "Master Teacher" plan.
2. To relate the lessons directly to the Nova Scotia curriculum for the grades selected.
3. To evaluate teacher and pupil response to television as a teaching aid in the classroom. (41, p. 2)

The Programs (41, p. 2)

1. All lessons were a half hour in duration and were scheduled from 2:30 to 3:00 p. m. The successive lessons in each series were spaced a week apart as shown in the following schedule:

(a) Grade IV Electricity

January 13, 1958 - Static Electricity
January 20, 1958 - Current Electricity
January 27, 1958 - Uses of Electricity

(b) Grade V Geography - Nova Scotia

January 15, 1958 - Physical Features
January 22, 1958 - Natural Resources.
January 29, 1958 - Trade and Trading Centres

(c) Grade VIII Mathematics - Percentage.

January 17, 1958 - Introduction Through Relation
to Fractions
January 24, 1958 - General Calculations
January 31, 1958 - Applications

Selection of Teachers

All teachers selected were competent classroom teachers, but were not necessarily experienced in the grade level at which they were teaching on television, nor specialists in the field to which they were assigned.

Participation

Twenty-eight schools and 3,091 pupils participated in the experiment.

Method of Evaluation

Evaluation was made principally on the basis of replies to questionnaires sent out to teachers and principals. The number of questionnaires completed were:

Completed by Grade IV teachers	- 32
Completed by Grade VI teachers	- 27
Completed by Grade VIII teachers	- 18
Completed by principals	- 5

Results of the questionnaire are given in detail in Appendix B.

Findings

1. In the order in which they appear most frequently on the questionnaire, the two most desirable qualities of television lessons are:
 - (a) A fresh approach by expert teachers with good equipment effectively used.
 - (b) New illustrations, experiments, etc., coupled with a general interest in TV stimulates concentration on the lesson.

2. In the order in which they appear most often on the questionnaire, the chief weaknesses of television lessons are:
 - (a) Lack of active participation by pupils and the inability of pupils to ask questions.
 - (b) No opportunity for teachers to test understanding before proceeding to another point in the lesson.
 - (c) A tendency on the part of teachers to lecture rather than teach.
 - (d) A tendency to teach too rapidly and over too long a period.
3. It was generally agreed that a thirty-minute lesson was too long for both Grades IV and VI. Some of the Grade VIII teachers also believed that it was too long for Grade VIII.
4. As indicated in Question No. 31 of Appendix A, only 31% of the Grade VIII teachers believed that television teaching had been effective in Arithmetic. The comparable percentages for the subjects of the other two grades were 85% and 58% respectively.

The large number of negative opinions of teachers of the Grade VIII Mathematics was based upon the opinion that Mathematics teaching requires a great deal of pupil participation in learning new work. It was the general opinion, however, that television teaching had distinct

possibilities in review lessons in Mathematics, and also for enrichment of the Mathematics Course. (41, p. 17)

5. Some teachers felt that TV lessons in Social Studies should not follow the "Master Teacher" plan, but should concern themselves with such things as "guided tours" to places of historical interest, current events, and dramatic presentations of outstanding historical events. (41, p. 14)
6. Some teachers stated that films or film strips had more to offer than did television in the teaching of Mathematics.

Conclusions

The following general conclusions were reached:

1. Television is primarily a teaching aid, and so used it has tremendous possibilities.
2. While it cannot give the same adequate service as a good classroom teacher, it can improve the teaching facilities available to those areas lacking classroom teachers or having only untrained or poorly qualified teachers.
3. It can assist inexperienced teachers in improving the quality of their work by giving them the opportunity to observe the techniques and methods of specialist teachers.

4. The "Master Teacher" plan as tried in this experiment seems to have a limited use, and other methods of teaching by television are considered to be more effective in handling such subjects as Social Studies.
5. The successful television teacher must be not only experienced and competent in the classroom, but also trained in the techniques of effective television teaching.
6. Effective teaching under the "Master Teacher" plan calls for the anticipation of possible questions. Important points must receive proper emphasis.
7. It is suggested that television lessons under the "Master Teacher" plan should be limited to fifteen or twenty minutes, and that they should be presented in an unhurried manner, and involve a limited amount of material.
8. Films and telecasts are complementary rather than rival agencies.
9. Highly qualified and efficient teachers are more interested in securing television lessons designed to supplement and enrich the regular work of the classroom than they are in the presentation of "Master Teacher" plan lessons which follow the curriculum closely.

10. Since television is a new teaching aid, it is necessary that teachers learn to integrate it with the regular work of the class. The provision of lesson outlines, and preliminary information and suggestions for follow-up activities are likely to assist the teacher to make proper use of television lessons.

THE FRENCH NATIONAL EXPERIMENT

Introduction

France is highly enthusiastic about educational television, and is developing it into a remarkable audio-visual instrument for schools, claiming to be the first country in the world to utilize instructional television on a nationwide scale. Every Monday, Tuesday, Wednesday, and Friday at 2.00 P.M., sixteen television transmitters throughout France broadcast a "Television Scolaire" program. This program originates from Paris, and is received by hundreds of classrooms throughout the country.

Purpose of Television Scolaire

The primary purpose of school television in France is to achieve enrichment. There is no thought or suggestion that it can ever be used as a means of meeting the teacher shortage. In this connection, Mr. Henri Dieuzeide, Chief of School Television, is quoted as saying, "We in France consider that teachers know their jobs. We cannot replace the teacher." (4, p. 4-5)

The Growth of Television Scolaire in France

The French first experimented with school television in 1945 with a schedule of one hour a week of educational programming. However, since the project was undertaken with only informal participation of educators, the telecasts were used by very few schools. In 1951, two weekly

telecasts were put on the air. In 1954, the number was increased to four weekly half hour broadcasts, and it has remained at that level since that date.

One factor contributing to the rapid growth of school television in France is the lack of any difficulty in regard to timing of broadcasts. This arises from the fact that all public schools in France proceed at exactly, or almost exactly, the pace prescribed by the French Ministry of Education in covering the prescribed courses of study. Accordingly, all classes are ready to receive any given program for a particular grade at the same time. A second contributing factor is to be found in the short lines of communication in a compact country such as France which reduce costs, and help to insure good reception. (4, p. 4-5)

Degree of Present and Planned Utilization of Broadcasts

Today there are a total of approximately 1200 primary, secondary, and technical schools that receive the programs regularly. It is planned to have 10,000 schools equipped to receive them by 1960. (22, p. 25)

Scheduling for Television Scolaire

Scheduling for Television Scolaire is planned by three committees composed of representatives from the National Ministry of Education, principals, teachers, psychologists, and TV personnel. Planning is oriented

as follows:

Committee One plans the programs for primary grades (ages 9-11). These programs are broadcast every Monday, and Friday. Committee Two plans the programs for secondary grades (ages 12-14) and Committee Three those for Vocational classes. Each of the foregoing goes on the air once a week. The table showing subjects and scheduling for the year 1955-56 follows.

TABLE XXII

TABLE SHOWING SUBJECTS AND MONTHLY SCHEDULING FOR 1955-56

Monday 2 P.M.	Tuesday 2 P. M.	Wednesday 2 P. M.	Friday 2 P.M.
(Primary) History	(Vocational) Commercial practices	(Secondary) Themes and Images	(Primary) Sciences
Geography	Industrial Use of Electronics	Geography	General cultural material
History	Applied Arts	Natural Sc.	Sciences
Geography	Metallurgy in Industry	Physical and Chem. Sc.	General cultural material

It is worthy of note that in the vocational courses TV is being used in a deliberate attempt to lead young people into new fields vital to the development of modern France.

National Participation of Teachers in Planning of Programs

National participation of teachers in the planning of programs is effected by the following methods:

1. A yearly meeting is held for the teachers who use TV in the classroom.
2. Teachers who use the programs are asked to report on the programs on critique forms which are provided.
3. Competitions are encouraged among teachers to supply scripts for the programs.
4. Teachers are used as producers and participants.

(4, p. 7)

The Use of Film Segments

Thousands of feet of film are screened each year to find clips which apply to a particular lesson. A single program may use footage from more than a dozen films. In addition to existing film, special footage may be shot where needed. "The French have no equal in their clever integration of film and live TV."

(4, p. 8)

Quality of Production

The quality of production varies according to the complexity of the script, but it is generally first rate. With only four half hour programs per week for the entire country, quality can be maintained.

Excellent use can be made of close-ups in the presentations because of the superb quality of the 819

line picture which makes it possible to pick up fine details. In fact, the quality of the TV picture in France is probably the best in the world. It is definitely superior to the U.S.A. 525 line picture or the 405 line picture of the BBC.

Teaching Guide

The television teaching is made more effective by the issue by the French Ministry of Education of a bi-monthly guide to teachers which offers suggestions in regard to preparation and follow up in connection with the TV lessons.

French Research Carried Out in 1955-56

Purpose of the Research

1. To determine whether television could be used effectively to teach the facts of geography to students of ten to thirteen years of age.
2. To compare the relative effectiveness of various teaching procedures.

Scope of the Experiment

The first broadcast was given to 265 pupils on November 14, 1955. The second one was given to 371 pupils five months later. Two hundred and sixteen pupils were involved in both experiments.

General Procedure

The technique used was to precede each broadcast by a pretest, and follow each with a post-test. The

gain in knowledge was measured by comparison of the results on the two tests. Knowledge of geographic terms was tested orally; knowledge of other basic concepts was tested by graphic means.

The number of questions on each of the four questionnaires and the mark allowed for each correct response were equated. Thus each broadcast furnished a double distribution. The one relating to the pre-questionnaire is called "x" in the tables, and the other relating to the post-questionnaire is called "y". Each pair of marks refers to the same pupil as all pupils were eliminated for whom one of the two marks was lacking.

Selection of Classes

Six classes of pupils in the Paris area were selected for the experiment, and each such class was divided into two homogeneous groups. One of these became the experimental group, and the other the control group.

The Experimental Design

The general procedure involved the application of statistical treatment to the results secured on the questionnaires with a view to determining (a) whether the use of television could be shown to be beneficial to the group as a whole, and (b) to determine the relative value of each of the following teaching procedures:

1. The value of preparing the class for the broadcast.
2. The value of follow-up (resume) by the teacher.
3. The value of the broadcast itself as a means of assisting students to acquire knowledge.

Accordingly, class I (experimental) and class II (its paired control) were both prepared for the broadcast, but the experimental class alone received follow-up assistance.

In the second part of the experiment, Class III (experimental) and Class IV, its paired control, both received follow-up assistance from the teacher, but the experimental class alone was given assistance in preparing for the broadcasts.

In the third part of the experiment, Class V (experimental) and Class VI (control) received the same treatment in regard to preparation and follow-up of the lesson, but the control class was denied the broadcast.

Due to circumstances beyond the control of those conducting the experiment (failure by some teachers to observe the instructions), the proposed plan could not be followed out to the letter, and the results of three classes (82 pupils) only could be used in that part of the experiment which had as its aim an evaluation of the various teaching procedures indicated under (1), (2) and (3) of this section.

The tests as conducted provided the following:

1. Scores for both broadcasts which made it possible to judge of their effectiveness.
2. Scores of three classes for the first broadcast which made it possible to study the relative effectiveness of the various teaching procedures employed. The three classes comprised eighty two pupils.

The statistical procedure followed was to analyze the results of the two broadcasts separately by the following methods:

1. By the method of variables which permits of a comparison of the results of different groups according to classes or according to treatments.
2. By the method of covariables which makes it possible to take into account the influence of the level of previous learning on the results of the broadcast consequently increasing the accuracy of the experiment.

The Results

Results of the First Broadcast

The first precaution taken was to make due allowance for differences in anterior knowledge, and thus to arrive at the degree to which change in scores was due to the influence of television "per se". This was arrived at with the help of the table of covariance that follows:

TABLE XXIII

THE EFFECT OF ANTERIOR KNOWLEDGE

Sources of Variation	Degree of Liberty	Sum of Squares "X"	Sum of Squares "Y"	Sum of Products	Coeff. of Regression	Coeff. of Correlation
Between the groups	k - I 11	A 1920.11	B 612.49	C 790.00	0.39	0.37
Within the groups	N-k-I 253	A 281.77	B 941.10	C 344.85		
Total	N - I 264	A 2201.88	B 1553.59	C 1134.85		

The foregoing table shows that after calculating the coefficient F of Snedecor the results indicate:

1. That the level of initial knowledge has an effect on the final result, since F equals 42.15 which is significant.
2. That television exerts an influence on the results since F in this case equals 6.43 which is also significant.

The Effect of the Various Teaching Procedures Used.

The effect of the various teaching procedures on gain in knowledge was arrived at by an analysis of variance of the score test data which is shown in tabular form:

TABLE XXIV

EFFECT OF VARIOUS TEACHING PROCEDURES

Sources of Variation	Degree of Liberty	Sum of Squares		Sum of Products	Coeff. of Regression	Coeff. of Correlation
		"X"	"Y"			
I Exp. Group						
Between the Groups	5	1027.28	567.45	538.61	0.19	0.24
Within the Groups	138	565.31	346.53	107.88		
Total	143	1592.59	913.98	646.49		
II Non-Exp. Group						
Between the Groups	6	423.66	249.78	173.52	0.38	0.47
Within the Groups	114	613.08	410.90	236.77		
Total	120	1036.74	660.68	410.29		

This gives the following:

	Experimental Group	Control Group
Degree of Liberty	143	120
Level of initial knowledge	F = 8.47 (significant)	F = 18.08 (significant)
Influence of Television	F = 34.57 (significant)	F = 10.54 (significant)

The foregoing results are affirmative in the four cases. But there is an important difference between the two groups in that the influence of television when associated with assistance from the teacher (either preparation or follow-up) is more marked than the influence of television alone.

An analysis of variance of the results on each pre-test questionnaire gave the results shown in Table XXV.

TABLE XXV

ANALYSIS OF RESULTS OF PRETEST QUESTIONNAIRE

Sources of Variation	Degree of Liberty	Sum of Squares	Mean of Squares	F
Between the Groups	1	172.55	172.55	17.55 (significant)
Within the Groups	263	2629.33	9.99	
Total	264	2801.88		

The foregoing results indicate that the two groups (experimental and control) differed significantly at the outset to the advantage of the control group of which the average score was 6.51 as compared with 4.89 for the experimental group.

TABLE XXVI

ANALYSIS OF RESULTS OF POST-TEST QUESTIONNAIRE

Sources of Variation	Degree of Liberty	Sum of Squares	Mean of Squares	F
Between the Groups	1	35.17	35.17	5.88
Within the Groups	263	1574.59	5.98	P = 0.01 (not significant)
Total	264	1609.76		

From the foregoing, it was evident that the two groups no longer presented significant differences as the means or averages of the control group was now 6.80 as against 6.07 for the experimental group.

Consideration of the Relative Effectiveness of the Various Teaching Devices used.

It was first necessary to verify that the two groups were comparable in respect to initial knowledge. This was accomplished by making an analysis of variances on the questionnaire coming before the broadcast by opposing the total of the three control groups to the total of the three experimental groups.

TABLE XXVII

COMPARISON OF THE TWO GROUPS RE INITIAL KNOWLEDGE

Sources of Variation	Degree of Liberty	Sum of Squares	Mean of Squares	F
Between the Groups	1	0.05	0.05	(not significant)
Within the Groups	80	644.07	8.05	
Total	81	644.12		

The foregoing indicated that the total of the control group was comparable to the total of the experimental group in regard to initial knowledge.

Similarly opposing in the same manner the total of the control groups to that of the experimental groups in an analysis of variances on the post-questionnaire the following results were obtained:

TABLE XXVIII

COMPARISON OF THE TWO GROUPS AFTER THE TELECASTS

Sources of Variation	Degree of Liberty	Sum of Squares	Mean of Squares	F
Between the Groups	1	1.15	1.15	(not significant)
Within the Groups	80	450.75	5.62	
Total	81	451.90		

Since there was no significant difference shown between the two groups, it was not possible to claim superiority for one or other of the two procedures used.

The foregoing results were confirmed by an analysis of variances on the gains after the broadcast by opposing the same two groups, as indicated in the following table:

TABLE XXIX

ANALYSIS OF VARIANCE OF GAINS

Sources of Variation	Degree of Liberty	Sum of Squares	Mean of Squares	F
Between the Groups	1	3.95	3.95	(not significant)
Within the Groups	78	764.53	9.80	
Total	79	768.48		

Hence the control group remained comparable to the experimental group in respect to gains in knowledge.

This was further borne out by a consideration of the means of these gains for each class as given in the following table:

TABLE XXX

ANALYSIS OF MEAN GAINS

	Control Group	Experimental Group
Class I	0.62	-.046
Class II	3.1	3.3
Class III	-0.48	0.57

Conclusions Based on Results of First Broadcast

1. There has been acquisition of knowledge.
2. The level of initial knowledge influences the results.
3. The teaching procedures used have an influence on the result.
4. It was not possible to distinguish the influence of preparation from that of the follow-up.

Results of the Second Broadcast

Applying the technique of analysis of covariances to the results obtained in the second broadcast, all of the foregoing conclusions were verified. (40, p. 13) The statistical evidence is not here included. As there was a good distribution as between the sexes in the second experiment, it was decided to investigate the relationship between sex and the gains made. A similar investigation was made in regard to the correlation between age and gains made.

The conclusions reached were:

1. The knowledge of the total pupils increased by the end of the television broadcast.
2. The gains varied according to classes.
3. The factors of age and sex are not determinant in so far as acquisition of learning is concerned.

Comparison Of The Results On The First And Second Broadcast.

Two hundred and sixteen pupils were present at the two broadcasts, and answered the four questionnaires. The average score obtained on each of the questionnaires is given as follows:

TABLE XXXI

COMPARISON OF RESULTS ON THE TWO BROADCASTS			
First Broadcast		Second Broadcast.	
Pre-questionnaire	Post Questionnaire	Pre-Quest.	Post Quest.
4.91	5.87	5.47	6.69

The foregoing indicates the following:

1. There is an increase in the average at the end of each broadcast.
2. There is a lowering of the average during the interval of time that separates the two broadcasts.

EDUCATIONAL TELEVISION IN ENGLAND

INTRODUCTION

The Purpose of the Experimentation

The purpose of educational television in England as stated by the School Broadcasting Council for the United Kingdom is "To find out whether television can make a valuable contribution to the work of the schools." (32, p. 1) Siepman amplifies the foregoing by adding that "the broadcasts were designed to supplement, not substitute, for the work of the ongoing teacher." (22, p. 22)

Sponsors

The school telecasts are provided by the BBC at the request of, and with the guidance of, the School Broadcasting Council. (29, p. 6)

Determination of Policy

Policy is determined by the teachers through their representatives on the School Broadcasting Council. The BBC confines itself to carrying out the policy after it has been formulated.

Growth of School Television in England

The first tentative trial of TV as a teaching aid took place in 1952. In the initial experiment, there were twenty broadcasts to classes in six secondary schools in Middlesex. Five subjects were taught: Science, Current Affairs, Geography, Arts and Crafts, and the Industrial Scene. Four sequent

lessons lasting twenty to thirty minutes were given in each subject. (22, p. 19)

Establishment of an Experimental Service

In the fall of 1957, a full fledged national program was launched on an experimental basis. Three hundred schools were pledged to participate in a program planned for secondary schools. Subjects taught were: Science, Current Affairs, Living in the Commonwealth, and a series on Careers. A single weekly broadcast was given in each of the four fields. (22, p. 22) Each lesson was 25 minutes in duration.

Grant Support

As an encouragement to Local Education Authorities to participate in the experimental service, the Ministry of Education paid grants to help defray costs of installing television receivers. These grants were calculated on the basis of population in each area.

Extent of Participation

A majority of Local Education Authorities agreed to cooperate in the experiment, and approximately 300 schools were equipped with television receivers by their efforts.

The total number of schools registered with the School Broadcasting Council as intending to use the

television broadcasts was 1023 as of November, 1958.

Reasons for Limiting the Programs to the Secondary Grades

The programs were directed to children in secondary grades because:

"It seems likely that at this level the contribution of television will be most distinctive, and the educational problems raised most challenging. Concentration on one type of school will ensure that an adequate body of evidence will be available on which to assess programmes." (29, p. 6)

The foregoing evidence is being collected from many sources including the teachers using the broadcasts, H. M. Inspectors of Schools, Local Education Authorities, and the Council's own Education Officers who are visiting schools to view the programmes with classes. It is planned to publish a report on the experiment in the fall of 1959. (32)

The Programs 1957-58

Notes for the Teacher and Pupils' Illustrated Pamphlets

Teachers' notes were issued for some of the series. They contain background material, book lists, maps and other illustrations, suggestions for preparation prior to the telecasts, suggestions for experiments and other follow-up activities.

Pupils' illustrated pamphlets were also issued for some of the series of telecasts. These were prepared as an integral part of the broadcasts and were referred to at the microphone.

The quality of both of the foregoing teaching aids is excellent.

TABLE XXXII

SCHEDULE OF PROGRAMS 1957-58

Day of Week	Term	Subject	Target Age
Mondays	autumn	Science & Life (Telecorded repeat)	12 - 14
Tuesdays	"	Living in the Commonwealth	11 - 15
Wednesdays	"	Science & Life	12 - 14
Thursdays	"	Spotlight	13 - 15
Fridays	"	A Series on Careers	about 14

(All programs were telecast between 2:05 and 2:30 P.M.)

Telecasts started on September 24, 1957 and continued to December 6 in the fall term. The schedule was resumed in mid-January, and continued to the end of March, 1958.

Notes on the Series (3, p. 11)

The "Science and Life Series", given on Monday was planned to develop the interest of children in the basic scientific principles behind a wide range of natural events and in the many applications of science

in our everyday lives. Some of the programmes also dealt with the social impact of science. Attention was given to sequence in that the programmes were grouped into half-term units, each of which formed a coherent whole. It was expected that the specialist teacher of science might use any or all of the units as a supplement to his own syllabus, while the non-specialist would probably wish to use the series as a basis for a balanced scheme of work. The notes to teacher and pupil contained many suggestions for experiments and observations that children can carry out for themselves.

The "Living in the Commonwealth Series" was planned to illustrate the resources and achievements of member countries of the British Commonwealth, and how natural resources affect the ways in which individuals and communities live. Although the series was planned to have a wide appeal throughout the secondary school, it was expected to be of special appeal to pupils in the 11-13 age range.

The "Spotlight Series" was designed to widen children's interest in the world around them and to stimulate them to further activity such as classroom discussion, reading, and closer observation of their environment. The programmes dealt with both current news and the general background to contemporary life. A variety of forms of presentation

were used including recently shot news film, studio discussions, studio interviews, and 'eye Witness' accounts of outside events.

The Series on Careers: The aim of this series was to provide a broad picture of the training, skills and problems of people working in a wide variety of occupations. It was also designed to give some help to the pupil who was soon to leave school in the matter of choosing a career.

The 1958-59 Program

Scope of the Program

To give more scope for experimentation, five separate programs are being used this year instead of four programs and one repeat as in the previous year.

TABLE XXXIII

SCHEDULE OF PROGRAMS 1958-59

Day of Week	Term	Subject	Target Age
Mondays	Autumn	Mathematics	12 - 13
Mondays	Spring & Summer	Natural History	11 - 12
Tuesdays	Autumn	Careers	14 (approx)
Tuesdays	Spring	Looking at Britain	13 - 15
Tuesdays	Summer	English Lit.	13 - 15
Wednesdays	Autumn	Science & Life	12 - 14
Thursdays	All Year	Spotlight	13 - 15
Fridays	All Year	Visual Arts	13 - 15

(All programs telecast between 2:05 and 2:30 P.M.)

The total number of programs per term in a series varies from five to six.

Notes on the 1958-59 Programs

The aims and content of the 1958-59 programs are given in the "Notes to Supplement the Annual Programme of the BBC Sound and Television Broadcasts to Schools. "When the programs are examined, it is found that each series usually consists of approximately ten weekly telecasts. The series may consist of ten closely related topics or may be broken up into two units with the topics in each unit being closely related. The outline of the Natural History Series is here given in detail for illustration.

The aim of the Natural History series is "to develop children's curiosity about their surroundings and to stimulate their appreciation of Nature through increased knowledge of what has influenced the distribution, habits and behaviour of the wild creatures of Britain." (31, p. 5) Sample units are included.

Unit I: Mammals in Britain

Four mammals have been selected for study in 1959 each of which shows the adaptation of one particular species to a special habitat. The badger makes its home underground; squirrels are

mainly arboreal; seals spend most of their lives in the ocean; and bats are specially adapted for life in the air.

January 12, 1959	Introducing mammals
January 19, 1959	Badgers
January 26, 1959	Squirrels
February 2, 1959	Seals
February 9, 1959	Bats
February 16 1959	(Half term repeat)

Unit II: How Animals Move

The four main habitats are the same as in Unit I thus linking the second unit to the first. However, in this unit the examples are not confined to mammals, but take in the whole animal kingdom.

February 23, 1959	Burrowing, Walking and Running.
March 26, 1959	Jumping and Climbing.
March 9, 1959	Swimming.
March 16, 1959	Flying.

Notes for the Teacher are provided for each series except Spotlight (Current Events) in which program the emphasis on topicality makes the advance selection of topics not feasible.

A Pupils' Illustrated Pamphlet is also placed in the hands of the pupil for the series in Natural Science.

Characteristics of the English Attitude Toward Educational TV - A Summary.

Some of the outstanding characteristics of the English attitude toward educational television are the following:

1. The English belief, based on experience to date, that TV as a teaching aid holds greatest promise at the secondary level.
2. That television is particularly well suited to the teaching of science.
3. That the proper role of television teaching in classroom instruction is as a supplement to regular classroom teaching. English teachers are strongly opposed to using it to any degree as a substitute for the classroom teacher.
4. The British traditional pre-occupation with quality which in radio broadcasting has resulted in the finest service in the world. The extent to which educational TV has been used so far in England is small, but the quality of the product is high. Some evidence of the English thoroughness of approach is to be found in the Notes for the Teacher and the Pupils' Pamphlet entitled Mammals in Britain sample copies of which have been placed in appendix "C".

Conclusion

Because of the recency of English experimentation in the field of educational television no full scale report has yet been issued. Such a report is planned for the summer of 1959.

THE NEBRASKA IN-SCHOOL
TELEVISION-CORRESPONDENCE STUDY PROGRAM

Introduction

Purpose of the Program

The Television-Correspondence program offered by the University of Nebraska was designed to assist certain high schools to make their instructional programs more effective by offering complete instruction in a number of high school subjects through the medium of Television-Correspondence courses. The courses required no supplemental teaching and were oriented, though not confined to small school systems. The program was expected to assist the local high schools in the following ways: (50, p. 1)

1. By making superior teaching available.
2. By making it possible to increase the number of courses offered.
3. By releasing teachers on the local staff so that additional pupil services could be provided.
4. By the improvement of instruction through the opportunity given to both teachers in service and teachers in training to observe superior teaching. (48, p. 1)

Scope and Duration of the Program

The program was begun in 1956 - 1957 when the University of Nebraska, in co-operation with the State Department

of Education used television-correspondence to teach beginning Algebra to 110 pupils in six small Nebraska high schools. In 1957 - 1958, the program was expanded to include the teaching of seven subjects. Table XXXIV lists the grade level at which each subject was offered, the hour at which each was presented on television, the number of telecasts per week in each subject, and the enrollment in each subject. No report has yet been issued on the 1958 - 1959 program. (50, p. 1)

Organization of the Program

Three elements are involved in the program of instruction: correspondence study, television, and a local supervisor.

The correspondence syllabus stands in place of the local teacher. It directs the student in his study and provides for reports to be submitted to the University for evaluation.

The supervisor is the connecting link between the local class and the university. He takes care of the operational details but does not participate in actual subject matter instruction. One of his important duties is that of keeping other staff members and the general public informed about the program.

The correspondence study courses themselves are developed by the University of Nebraska Extension Department of Correspondence Study which has the oldest university

operated program of high school correspondence study in the United States.

Each lesson consists of a thirty-minute telecast at the beginning of the class period with a follow-up period which varies from ten minutes to twenty-five minutes in different schools. Classes meet in regular session on days when there is no television presentation, and pupils engage in directed study based on the study syllabus provided. (50, pp. 1 - 3)

TABLE XXXIV
THE NEBRASKA EXPERIMENT
COURSES TAUGHT, FREQUENCY OF TELECASTS,
ENROLLMENTS BY SUBJECT

<u>Course</u>	<u>Grade Level</u>	<u>Hour</u>	<u>Days Per Week</u>	<u>Enrollment</u>
Physics \mathbb{W} \mathbb{W}	11 - 12	9:00 a. m.	5	100
Algebra, First Year	9	10:00 a. m.	3	96
General Mathematics	10	10:00 a. m.	2	67
Plane Geometry	10	11:00 a. m.	5	110
Senior English	12	1:00 p. m.	5	152
Spanish First Year	9 - 10	2:00 p. m.	3	84
Beginning Art	9 - 12	2:00 p. m.	2	62

\mathbb{W} All telecasts were thirty minutes in length.

\mathbb{W} White films were used in the Physics course.

The Experimental Program 1957 - 1958

Purpose

The purpose of the experimental program carried out in 1957 - 1958 was to compare the achievement of students in the participating or experimental schools with that of students in non-participating schools used as a control group. (48, p. 4)

Procedure

The experimental group was made up of 671 students who had indicated an interest in the seven subjects to be offered by TV-Correspondence instruction. Table XXXV shows the enrollment in the experiment according to group and courses taught. (48, p. 3)

Two control groups were set up. One of these, called the "Small Control Group", was drawn from schools with an enrollment range of forty-eight to 170. The "Large School Control Group" was drawn from schools which ranged in enrollment from 856 to 1,992. (48, p. 5)

At the beginning of the year the Henmon Nelson Test of Mental Ability was administered to all pupils in each of the three groups. In addition, aptitude tests and/or achievement tests were administered to all pupils before instruction began. At the end of the first semester, achievement tests were administered to experimental and control groups in first semester Algebra, Plane Geometry,

and Physics. At the end of the school year, achievement tests were administered to all pupils in all subjects except Art. (48, p. 7)

TABLE XXXV
ENROLLMENT IN THE EXPERIMENT
ACCORDING TO GROUP AND COURSES TAUGHT

<u>Course</u>	<u>Experi- mental</u>	<u>Small Control</u>	<u>Large Control</u>	<u>Total</u>
Algebra	177	291	261	729
Geometry	103	120	378	601
Physics	107	121	285	513
English	113	306	232	651
Mathematics	68	157	-	225
Spanish	79	174	-	253
Art	<u>44</u>	<u>129</u>	<u>-</u>	<u>173</u>
Total:	<u>691</u>	<u>1,298</u>	<u>1,156</u>	<u>3,145</u>

Table V of the original report lists the tests used in the experiment according to courses taught and time of administration. This table has not been included.

In connection with Algebra, Physics, Geometry, and English, a comparison of the three groups was made in regard to achievement when ability was controlled. Comparisons were made at Midyear and at the end of the year for Algebra, Geometry, and Physics: Comparisons were

also made at the end of the year with regard to scores in English; In General Mathematics and Spanish comparisons were made at the end of the year. The groups were not compared with respect to art achievement. (48, p. 7)

The Test Results

The results of the analyses are summarized in Tables XXXVI and XXXVII. Table XXXVI shows the mean scores of pupils in each group by pre-test, midyear test, and final test. Table XXXVII indicates whether the differences between the means were statistically significant.

Consideration of the two tables indicates that no significant differences in Algebra achievement existed between groups at the end of the year. In Geometry, the Large School Control Group excelled the other two groups significantly, but the Small School Control, and the Experimental Groups did not differ significantly. On one of the two final tests in Physics, no significant differences were found. On the second final Physics test, administered to a different sample of students in the Large School Control Group, the Large School Control Group exceeded the other two groups significantly. The Experimental and the Small Control Groups did not differ significantly, however. On a final literature test, (English), the Experimental Group did not differ from the Small Control Group. On a final Mechanics of English test, the Large School Control Group exceeded the other

NEBRASKA EXPERIMENT

TABLE XXXVI

Summary of Test Results According to Course and Group

Group	Criterion Tests			Pretests			
<u>First-year Algebra</u>							
	<u>Final Coop. Alg.</u>	<u>Midyear Seattle Alg.</u>	<u>Alg. Apt.</u>	<u>Seattle Pretest</u>	<u>Hermon Nelson</u>		
Experimental	24.2	115.2	70.2	88.8	105.1		
Small School Control	21.4	120.5	59.3	95.6	108.4		
Large School Control	23.5	121.2	61.8	101.3	114.7		
<u>Plane Geometry</u>							
	<u>Final Coop. Geom.</u>	<u>Midyear Seattle Geom.</u>	<u>Seattle Geom.</u>	<u>Hermon-Nelson</u>			
Experimental	23.6	111.3	83.7	110.0			
Small School Control	24.	114.3	91.2	110.9			
Large School Control	29.2	116.2	93.4	106.7			
<u>Physics</u>							
	<u>Final Dunning</u>	<u>Final Ohio</u>	<u>Midyear Ohio</u>	<u>ITED-2</u>	<u>ITED-6</u>	<u>Ohio Pretest</u>	<u>H-N</u>
Experimental	32.4	32.7	22.8	74.6	50.8	13.6	109.3
Small School Control	31.2	31.4	20.4	75.9	59.2	15.3	111.6
Large School Control	40.4	33.1	28.8	71.6	66.3	17.3	116.6
<u>English</u>							
	<u>Final Coop. Lit.</u>	<u>Final Coop. Mech.</u>	<u>Final Coop. Comp.</u>	<u>Pretest C-1</u>	<u>Pretest Lit.</u>	<u>H-N</u>	
Experimental	20.8	134.8	44.3	58.3	43.5	109.3	
Small School Control	22.8	134.0	66.7	48.3	46.2	111.5	
Large School Control	-	142.8	88.0	59.0	-	115.2	

NEBRASKA EXPERIMENT

TABLE XXXVI
(continued)

Group	Criterion Tests		Pretests	
	<u>General Mathematics</u>			
	Final Coop. Math.	<u>Final Davis</u>		
Experimental	50.3	26.5		
Small School Control	55.9	27.5		
	<u>Spanish</u>			
	<u>Final Coop. Spanish</u>		<u>Luria-Orleans</u>	
Experimental	43.4		140.9	
Control	60.1		122.9	
	<u>Art</u>			
			<u>Design Judgment</u>	<u>Hermon-Nelson</u>
Experimental			47.9	101.9
Control			48.8	105.6

NEBRASKA EXPERIMENT

TABLE XXXVII

Summary of Results

Course	Criterion Test	Comparison \bar{X}	Significance
Algebra	Midyear Seattle Algebra Test	Small School Control-Experimental	Not sig
		Large School Control-Experimental	Sig 1 %
		Large School Control-Small School Control	Sig 1 %
	Final Cooperative Algebra Test	Experimental-Small School Control	Not sig
		Experimental-Large School Control	Not sig
		Large School Control-Small School Control	Not sig
Geometry	Midyear Seattle Plane Geometry Test	Small School Control-Experimental	Sig 5 %
		Large School Control-Experimental	Sig 1 %
		Large School Control-Small School Control	Not sig
	Final Cooperative Geometry Test	Small School Control-Experimental	Not sig
		Large School Control-Experimental	Sig 1 %
		Large School Control-Small School Control	Sig 1 %
Physics	Midyear Ohio Physics Test	Experimental-Small School Control	Not sig
		Large School Control-Experimental	Sig 5 %
		Large School Control-Small School Control	Sig 1 %
	Final Ohio Physics Test	Experimental-Small School Control	Not sig
		Large School Control-Experimental	Not sig
		Large School Control-Small School Control	Not sig
	Final Dunning Physics Test	Experimental-Small School Control	Not sig
		Large School Control-Experimental	Sig 1 %
		Large School Control-Small School Control	Sig 1 %

NEBRASKA EXPERIMENT

TABLE XXXVII
(continued)

Summary of Results

Course	Criterion Test	Comparison \mathbb{X}	Significance
English	Final Cooperative Literature Test	Small School Control-Experimental	Not sig
	Final Cooperative Mechanics of English Test	Experimental-Small School Control	Not sig
		Large School Control-Experimental	Sig 1 %
		Large School Control-Small School Control	Sig 1 %
	Final Cooperative Test English Comprehension	Small School Control-Experimental	Sig 1 %
		Large School Control-Experimental	Sig 1 %
Large School Control-Small School Control		Sig 1 %	
General Mathematics	Final Cooperative Mathematics Test	Small School Control-Experimental	Not sig
	Final Davis Mathematics Test	Small School Control-Experimental	Not sig
Spanish	Final Cooperative Spanish Test	Control-Experimental	Sig 1 %

\mathbb{X} In each comparison of two groups, the group having the higher mean is shown on the left. Thus, the group appearing on the left twice in any triad of comparisons is the group ranking highest of the three. Any group not appearing on the left (or appearing twice on the right) is the group ranking lowest of the three.

two groups significantly. On this test the Experimental Group did not differ significantly from the Control Group. On a final English Comprehension test, the Large School Control Group scored significantly higher than the Small School Control Group, which in turn, scored significantly higher than the Experimental Group. In General Mathematics, the Experimental Group did not differ significantly from the Small School Control Group on two final achievement examinations. In Spanish, both control groups exceeded the Experimental Group to a significant degree. (48, p. 8)

Conclusions Based on the Test Results

"Because the 1957 - 1958 In-School Television Correspondence Study Program was an exploratory experiment with many identifiable circumstances for improvement, no firm generalizations are offered from these data. Rather, the data assembled from the experiment are to be considered as reference points from which future research will be initiated. It may be said, though, that achievement tends to be higher in the experimental schools than in the small control schools, but somewhat lower than in the large control schools." (48, pp. 8 - 9)

Evaluation of Courses by Parents, Supervisors, Students and Teachers

Evaluation by Parents

Of eighty-six parents who returned questionnaires, fifty-five wanted the program continued and thirty-one did not. Those who wished the program continued referred to its superior teaching and to the high standards maintained in the courses. Some also mentioned the fact that subjects were offered which would not otherwise have been available.

Those opposed gave as their principal reasons the lack of personal contact between pupil and teacher, and the inability to ask questions at the time they arose.

Evaluation by Students

A study of Student Evaluations, (48, p. 10), indicated the following:

1. That a large majority of the students in all classes felt that the TV-Correspondence study classes were harder than their traditional classes.
2. That slightly less than one-third of the pupils said that they enjoyed the TV-Correspondence study courses more than their regular classes. This may have been due to the fact that the method was new to them and/or the standards set were higher than the students had been accustomed to in their own schools.
3. The students were fairly equally divided on the question of whether they had learned more by the TV-Correspondence courses.

Student attitudes toward the experimental courses seemed to be affected to some degree by their feelings of success or failure in the classes they were taking.

Evaluation by Teachers Not Involved in the Experiment (48, p. 13)

Of thirty-four teachers, seventeen were generally favorable to the program, and an equal number were opposed.

Some felt that it was an excellent way to broaden the curriculum of the small school. Others felt that it

would be better for special groups of students such as "the gifted". Principal weaknesses mentioned were the lack of direct teacher-pupil contact, and the difficulty of giving pupils special help when needed.

THE HAGERSTOWN PROJECT

Introduction

Purpose

Siepmann has stated that the principal aims of the Hagerstown Project are the following:

1. To experiment with the use of closed circuit television in direct teaching under a master lecturer.
2. To use television to supplement and enrich normal teaching.
3. To extend the in-service training of teachers.
4. To interpret the school program to the public.

In amplification of the foregoing, Lambert has said that the Hagerstown experiment appears to have two objectives:

- (a) To show whether TV can help the classroom teacher to improve the efficiency of instruction.
- (b) To show whether TV, by expanding the scope and status of the specially skilled teacher, can help remedy the teacher shortage in two ways:
 - (1) By enabling fewer specialist teachers to spread their work over more schools.
 - (2) By freeing the ordinary classroom teacher from giving basic instruction, and so enabling him to teach larger classes of pupils. (49, p. 9-10)

Scope of the Experiment

The five year project was begun in November 1956 with the offering of televised direct instruction to 6000 pupils in twelve grades. Two of the schools were senior high schools, and the remaining six were elementary schools. In the following year, the program was expanded to include the same two senior high schools, three junior high schools, and eighteen elementary schools, with a total enrollment of 1200 pupils. Future plans call for instruction by television in all forty eight schools in Washington County to a total of 20,000 students. (10, p. 1E)

Sponsorship

The Ford Foundation undertook to bear the entire cost of the experiment other than the cost of teachers' salaries which was borne by the Washington County Board of Education. The equipment was supplied by the Radio Electronics Association of America.

The Public Relations Program

Care was taken to enlist the support of the local community through continuous publicity among parents, and business and social organizations. (49, p. 3)

Buildings

Two buildings that were nearing completion at the time of entering upon the project were altered to some extent to make them more suitable for television. In some of the older buildings, a partition was removed here and there, but no major changes were made. Auditoriums and cafes were also used for viewing purposes although they were not ideal for the purpose. (49, p. 2) In three senior high schools that were being built changes in plans were made to provide flexible space to accommodate large and small groups of students. The viewing areas were, for the most part, placed in the interior of the buildings thus eliminating interference from outside lighting. Indirect lighting was provided. The small areas that surrounded the large television viewing areas were so planned that teachers might conveniently work with small groups of students as required. The space at the end of the eye beams was so arranged that it could be used to carry the television cables. This made it possible to open the spaces and install cables without bothering the structure at all. (49, p. 6-7)

Preliminary Planning

Training of Teachers

Before starting the project, a workshop was held in the summer of 1956 which was attended by

fifty teachers, supervisors and principals. A number of resource persons were also brought in from outside, many of whom had had previous experience in the use of television for educational purposes. The workshop was planned to accomplish two main objectives:

1. To find out what other people had learned about the use of television in an educational program.
2. To use the foregoing information to plan a program for Hagerstown.

In the summer of 1957, another workshop was held with 150 teachers, supervisors and principals in attendance. In this workshop an attempt was made to evaluate the effectiveness of the program which had been in operation during the preceding year. (47, p. 2-3)

Basic Assumptions in Regard to Television's Use

The problems of learning and Television's use were analyzed. On the basis of the analysis it was felt that television: (2, p. 1)

<u>Probably Could</u>	<u>Probably Could Not</u>
Motivate and stimulate	Handle classroom discussion
Inform	Care for individual differences
Show applications	Clear up misunderstandings immediately
Demonstrate	Supervise needed drill
Enrich backgrounds	Provide follow-up of lesson
Raise questions	Direct activities growing out of a lesson
Provide common experiences	
Suggest activities	

Probably CouldProbably Could Not

Challenge pupils to assume more self responsibility for learning.

Help pupils to do something about the things learned.

The Concept of the Teaching Team

From the foregoing analysis arose the concept of the teaching team with the television teacher being responsible for the items that television could do best, and the classroom teacher for those functions that could be better handled by direct contact with the pupils. Studio and classroom teachers met once a month to plan the sequence of lessons and to make any necessary alterations in the sequences previously planned. The classroom teacher was regarded as indispensable to the success of the project, and every effort was made to give her proper recognition. In this connection Brugger has said:

"Our opinion is that the classroom teacher is as important, perhaps more important, than the studio teacher The studio teacher merely presents the material; the classroom teacher still moulds the personality, develops and stimulates students' thinking, and is a very important part of the teaching process." (10, p. 3E)

The Program in Action 1956-57

Features of the lesson Planning

1. The television lessons involved daily sequential

instruction and the use of a basic text.

2. In regard to allotment of time, the television lessons took up twenty to thirty minutes of the total time available. For example one hour daily was given to instruction via television. (49, p. 5) In the high school, the classes ran for sixty minutes with half of the time being used for the television presentation and the other half for classwork. (10, p. 3E) No class in the system was given more than two television periods per day.
3. The classroom teachers were to assume the primary responsibility for meeting individual needs that existed among the pupils of their respective groups. This involved, not only conditioning the pupils for the televised lesson, but also clearing up any difficulties that arose during the lesson by way of follow-up. It also involved adjusting the lessons and assignments to meet the needs of the group above or below the normal grade level of achievement. (49, p. 3)
4. All television lessons were repeated several times on different days for the convenience of teachers in the receiving schools.
5. A Television Guide was printed each week and distributed to all teachers. (49, p. 4)
6. In the studio, a class of students of the appropriate grade was taught a lesson by their

teacher, this teacher having been selected as the outstanding "master teacher" of that subject. (49, p. 5)

7. The television teacher was released from all other teaching except the delivery of her one TV lesson per day.
8. Films and film-slides were used as a part of some of the television lessons.
9. The subjects taught in each of the two complete years during which the programs have been running follows:

1956-57

Advanced Senior English
 General Senior English
 History XI
 Geometry X
 Science IX
 Science VI
 Arithmetic V
 Music IV, V, VI
 Art IV, V, VI
 Art I, II, III
 Reading I, II
 Numbers II, III

1957-58

Arithmetic IV, V and VI
 Science VI, VII, VIII, IX
 Geometry X
 Social Studies IV, V
 Mathematics VII, VIII
 Special Education VI, VII, and VIII
 Core Subjects VII, VIII
 Music I-VI inclusive
 Art I-VI inclusive
 Practical Arts VII, VIII
 History SII
 Guidance VII, VIII, IX
 English XII

For purposes of illustration, the grade V Arithmetic teaching program is developed in some detail.

The Arithmetic Program in Grade V (47, p. 4-5)

The Iowa Test of Basic Skills was administered in September to the eighteen grade V classrooms and the results showed the classes to be below the

expected mean equivalent of 5.1 for fifth grade pupils. Accordingly, it was decided to place primary emphasis on the understanding of basic concepts in number relationships.

During the year 1956-57, there were 122 arithmetic lessons televised. There were dark screens on five days to permit classroom teachers to administer unit tests and midterm tests. The results of these tests were analyzed by the studio teacher to find out which concepts were offering difficulty. To provide new teaching and review the "60 second challenge" was devised. At the beginning of each lesson a selected problem was presented, and the pupils challenged to solve it within the one minute time limit.

In may, an alternative form of the same test was administered. The extent to which the class mean was raised, from that of the first test was taken as a measure of growth.

No attempt was made in the first year of experimentation to set up matched controls. For this reason, it was not possible to draw a comparison between the progress of pupils who had received television instruction with that of pupils who had not received such teaching. However, in order that such a comparison could be made in 1957-58, one of the tests was given to 334 pupils in

additional grade V classrooms. The pupils in these classrooms had not received televised lessons in 1956-57, but did receive them in 1957-58. The report on the experimentation in the year 1957-58 will be published later in the spring term, 1959.

The Junior High Program 1957-58

The Junior High School program which started in 1957 is one of the most interesting parts of the program. One of the interesting things done was to experiment with large viewing groups. After the television presentation, the viewing groups were broken down into small discussion groups. This type of organization was used to reduce the number of teachers required. For example with an enrollment of 594 Junior high school pupils in two schools, the number of teachers ordinarily employed is twenty eight. During 1957-58 the number actually used was 23.4 teachers which is a difference of 16.4%. The report soon to be published will deal with the important question of the relative efficiency of the two procedures.

Findings and Conclusions

Due to the lack of matched controls in the first year of experimentation, the report warned that any findings must be regarded as purely tentative and subject to revision in the light of the more scientifically based findings of the experimentation to be carried out in 1957-58. However, if the 334 pupils who did not

receive television instruction in grade V Arithmetic were comparable with the 508 pupils who did receive such instruction, the results proved the value of the televised lessons according to the report. No actual figures have been given out on the experimentation carried out in 1956-57 because it was felt that there were too many variables in the experimentation that had not been controlled. However, it was stated that gains made by the group that had received part of its instruction by television were exceptional. It was further stated that growth in arithmetic appeared to be commensurate with ability. (49, p. 7)

Cahall has given the following "possible inferences" from the progress of the experiment to date: (49, p. 7)

1. The vast majority of students enjoy and profit from the TV lessons.
2. "The use of TV makes possible a special concentration of teachers' efforts and expert skills."
3. "The use of TV makes possible and advantageous reallocation of teachers' time. It also makes possible the best use of the capacities of specialist teachers, especially in elementary classrooms."
4. "The classroom teachers do a better job of teaching because of what they see on TV."
5. "The saving of teachers' time makes it possible to give more personal attention to the students."
6. "The students, in general say they prefer 'live' instruction to TV instruction, but also prefer first class TV instruction to average 'live' instruction."

Finally, Cahall noted that the reorganization put into effect at the Junior High School level had

made it possible to effect a saving of over 16% in teaching personnel.

Questions Raised by the Hagerstown Experiment

Lambert has said that "nothing definite has yet been proven at Hagerstown," and has raised the following questions with regard to the experimentation there: (49, p. 10)

1. "Hagerstown claims that the employment of specialist TV teachers saves the time of the classroom teachers by relieving her of basic instruction. Is this saving of time compatible with an improvement of teaching standards?"
2. "Will the employment of specialist teachers for TV reduce the total number of specialist teachers required by a school system employing the Hagerstown method?"
3. "Will the giving of basic instruction by specialist teachers on TV take the challenge out of ordinary classroom teaching? Will it lessen the incentive to enter the teaching profession?"
4. "Could a long term wide scale development of the Hagerstown method lead to the creation of two separate types of teaching skill (a) TV specialists (b) Classroom 'baby-sitters'?"
5. "The Hagerstown experiment involves a ruthless centralization of teaching, to make sure that all classes follow the course of studies at the same pace. The pacing is set not by the students' capacity but by the schedule of the TV lessons. Is not this centralization the antithesis of good teaching practice today, which appears to be to devolve increasing responsibility on the individual teacher for choice of text books and pace of teaching the subject?"

It is expected that the report for the year 1957-58 will provide at least a partial answer to these and other questions.

CHAPTER IV
FINDINGS AND CONCLUSIONS

Effect of Television on Pupil Achievement

A finding of the French experiment outlined in this report was that "the influence of television when associated with assistance from the teacher is more marked than the influence of television alone." (p. 116)¹

In the Pittsburgh experiment - an experiment in which the television teaching was supported with limited supplementary teaching - the gains in achievement showed a small but significant difference in favor of the control group. (pp. 26 and 28)

The television classes in Grade IX Science and Grade IX Composition in the St. Louis experiment showed a degree of achievement at least equal to that of matched control classes taught in the conventional manner. This was a startling finding in view of the fact that the classes received their instruction wholly by television without benefit of supplementary teaching. Of course, it is not possible to draw any valid conclusions on the basis of the results of a single experiment. However, it may be significant that there has been no further attempt to emulate the procedure followed in St. Louis of teaching large classes (or small classes) by television alone. This may

1. Page 116 of the thesis. Similarly, other page references occurring alone refer to the thesis.

indicate that the claims of success for the St. Louis experiment may not have been too well founded in fact. In any event, the trend is definitely away from relying on television alone to do the teaching job. In that connection, the Hagerstown experiment offers a good illustration of the importance attached to supplementary teaching.

In the Hagerstown experiment, the experimental classes in Grade V Arithmetic showed superiority over the control classes that were not receiving any part of their instruction by television. It was also suggested in the report, although not documented, that in the Junior High School experiment in teaching large classes by television, the achievement of the television classes was superior to that of the control classes even though the staff was reorganized to effect a saving in teacher personnel of over 16%.

If it can be proven that such a saving of teacher personnel may be effected without sacrificing the efficiency of the teaching process, then indeed a most important step forward has been made. This feature is of particular interest for, as has been previously noted, such a reorganization of the teaching staff is directly opposed to the trend of philosophical thinking in Canada, France, and England at the present time. In any event, much more experimentation would be required before any valid conclusion might be reached.

Examination of the various studies included in this report would indicate general agreement with the suggestion made in connection with the Pittsburgh experiment that:

"It is doubtful if television teaching without supplementary teaching can be a substitute for regular classroom teaching at the elementary school level...A classroom teacher is needed to meet individual needs, to maintain good teacher-pupil relationships, to carry on drill and practice, and to provide for the interaction involved in class discussion." (p. 42)

On the other hand, the studies would also appear to bear out the finding that television teaching supplemented with good supporting instruction from the classroom teacher may make it possible to reach a standard of achievement at least as high as that reached by conventional teaching methods.

Television in Relation to Teacher Status

The emphasis placed on the recruitment of top flight teachers for television teaching has led some educationists to become concerned over the possible decline in status of the classroom teacher. It is felt that the "Master Teacher" may become a prestige figure with the classroom teacher being relegated to the status of a caretaker.

While there was some early tendency in that direction, as for example in the St. Louis experiment, there is evidence that perspective has been regained in large measure. The present more commonly prevailing attitude has been well expressed by Stoddard in these words:

"While it is possible, and even likely that some changes will come about in the functions to be performed by teachers...there will still need to be carried on the direction and supervision of activity programs, group discussions, drill, testing and remedial teaching; the development of ability of pupils to evaluate, exercise critical judgment, and do problem solving; and the establishment of desirable habits and worthy ideals...New and additional tools have always multiplied the importance and need for (classroom) teachers." (44, p. 30)

The same attitude is well exemplified in the prevailing practice at Hagerstown where the classroom teacher is regarded as the senior member of the teaching team for "the studio teacher merely presents the material; the classroom teacher still moulds the personality, develops and stimulates the students' thinking, and is a very important part of the teaching process." (10, p. 3E) It is also found in the attempt being made through the workshop training program at Hagerstown to show that any good teacher can be trained to handle television teaching effectively. Every effort is being made to overcome the conception of the television teacher as a member of a race apart.

A further practical illustration of the same general tendency is to be found in the refusal any longer to allow the television teacher to monopolize the class period unduly. Whereas formerly the television presentation was often allowed to take up all, or nearly all, of the class period, the present trend is to limit it to not more than half of the total teaching time.

With wise use, it is probably true that television may be used to enhance rather than to reduce the status of teachers generally. In order that television may not become discredited through improper use, it is perhaps well to err on the side of limited use until its function has been more clearly defined in the light of further experimentation and research.

The Need for Teacher Participation and Co-operation

Many of the studies under review stress the need to involve both classroom and studio teachers actively in planning and carrying out the television programs.

In England, as has been noted, policy is determined by teachers through their representatives on the School Broadcasting Council. This is in keeping with the English tradition of giving teachers wide powers in setting up curricula to meet the needs of individual schools.

In France, a very active and successful program has been established designed to secure national participation of teachers in preparing programs and putting them into use. Details are to be found on page 116 of this report.

At Hagerstown, great care has been taken to build up a spirit of co-operation between the studio and classroom teachers. Monthly meetings are held at which the two groups of teachers jointly plan the sequence of lessons, and make any necessary changes in those previously planned.

Every effort is made to encourage studio and classroom teachers to regard themselves as partners in an important co-operative enterprise.

Since in the last analysis the success or failure of the television project will largely be determined by the attitude of the teachers toward it, it is important that they be fully identified with the project.

Optimum Length of Television Presentation

Programs in France are a half hour in length. Those in England were limited to twenty-five minutes in 1957 - 1958. In the Pittsburgh experiment, television periods in Reading and Arithmetic were twenty-five minutes in length, supplemented with fifteen minutes of classroom teaching. In Reading, there was one additional full supplementary period a week. In the St. Louis experiment, Grade IX Science and Composition were taught by television for thirty minutes a day, five days per week. Dr. Shinnerer, who had been retained to observe and report on the experiment, marked a great deal of inattention among students and suggested that it was probably due to the television lessons being too long. At Hagerstown, the television lessons took up twenty to thirty minutes of the total time available. For example, of the hour devoted each day to Arithmetic, twenty minutes went to instruction by TV and the balance was used by the classroom teacher for supplementary work.

Following the experimentation in Halifax, it was suggested that thirty-minute periods were too long for Grades IV and V and possibly for Grade VIII as well. It was further suggested that television lessons under a "Master Teacher" should be limited to fifteen to twenty minutes a day and that they should be presented in an unhurried manner and involve a limited amount of material. Manitoba programs and those in Canada generally have been a half hour in duration.

The degree to which television lessons should be restricted in duration would appear to depend a good deal upon the amount of supplementary teaching required. However, in presenting a lesson in a subject such as Arithmetic, the principal emphasis should be on supplementary teaching. In support of this view, it may be recalled that in the Pittsburgh experiment most of the suggestions for improving the teaching of Grade V Arithmetic had to do with increasing supplementary time while reducing television time.

On the basis of the experimental evidence under review, the following tentative conclusions are offered:

1. That in general, television presentations should vary between twenty and thirty minutes in length depending upon subject matter and grade.
2. That in the teaching of basic course material, at least half of the class period should be reserved for supplementary teaching.

3. That in the offering of enrichment type programs a greater share of the class period may profitably be devoted to the TV part of the presentation than in the preceding instance.

Timeliness of Telecasts

One of the principal criticisms levelled at the use of television in the classroom is that there is a lack of flexibility in its use in regard to timeliness. This has arisen from the practice of televising programs on a fixed schedule without regard to the needs of the classes receiving them.

The foregoing criticism, while justified in large measure in the light of existing practice, is not a weakness inherent in the medium itself, as it is technically possible to present a program in a closed circuit system by kinescope recording at any time desired. In that connection, it is worth noting that there has been a recent rapid increase in the use of kinescope recordings in schools. This is brought out by the fact that during the 1958 test week, thirty-two per cent of educational television programs were kinescopes as compared with twenty-four per cent in 1957. Further evidence is to be found in the fact that St. Louis used kinescopes for in-school offerings almost exclusively in the year, 1958, and Pittsburgh used them about half time. (49, p. 2) At Hagerstown

also, it has been the practice to repeat all TV lessons several times on different days on kinescope in order to allow teachers to use them at times best suited to class needs.

In the Pittsburgh experiment, it was noted that TV lessons lacked flexibility with regard to individual differences that exist within a class, and that the tendency is to present lessons suited to the needs of the middle I. Q. group. This means that the needs of pupils both below and above the average can only be met if these groups receive special attention from the classroom teachers. This type of criticism has a familiar ring, and merely serves to emphasize the danger of expecting television to do too much. It cannot take over the role of the teacher, but may have considerable value as a teaching aid.

It is to be noted that there is little problem in regard to timeliness in presenting lessons of the enrichment type. On the other hand, there is a considerable problem in presenting basic course material in such a way as to meet individual needs, particularly in such a subject as Arithmetic that calls for mastery of skills that involve much active participation on the part of students. A good example of the foregoing general statement of principle is to be found on page 33 of the present review.

The Relative Value of Various Types of Television Presentation

The studies under review involved the use of a large number of different types of lesson presentation. In the Canadian experimentation outlined on page 88 of this report, the "Master Teacher" technique was used in seven programs. Of these, one made use of a cartoonist. Eight others were in completely dramatized form. Fantasy was used in one program. All types of presentation were considered to be successful.

In Manitoba, the "Master Teacher" plan was found to work well in Science teaching, while the dramatized portions were the most effective parts of the literature programs.

The Halifax report suggested that perhaps television lessons in Social Studies should not follow the "Master Teacher" plan at all but should rather concern themselves with such things as guided tours to places of historical interest, current events, and dramatic presentation of outstanding historical events.

Much of the experimentation in the United States has involved the use of the "Master Teacher" plan of presentation.

The findings indicate that there is no one best method of presenting television lessons, and that the types of presentation will vary according to the nature of the material to be taught. There is also some indication that in the future there may be somewhat lesser stress placed on programs of the "Master Teacher" type.

Teacher Qualifications and Training

In all of the experiments reported, the television teacher was selected with the greatest care. The three principal criteria of selection, as indicated by frequency of mention, were success as a classroom teacher, warmth of personality, and fluency. Other criteria mentioned in one or more of the reports were adaptability, voice quality, health, appearance, emotional maturity, and willingness to undertake the hard work involved.

Although most of the teachers so selected did a creditable piece of work in their new capacity, there has been a growing conviction that special training is needed if the best results are to be obtained. The best as well as the most recent example of a comprehensive attempt to give teachers the necessary training is to be found in the experimentation being carried out at Hagerstown which has previously been dealt with in detail. The remarkable increase in the numbers of teachers taking the summer workshop training is evidence that the program is meeting a felt need. It is also worthy of mention that Cahall has stated that the experiment gave rise to an in-service program of teacher training as fine as any in the past history of Maryland schools. (47, p. 2)

Another noteworthy attempt to prepare television teachers for their exacting work is to be found in the procedure followed in the St. Louis project of recording

lessons on kinescope film, and having them previewed by television and classroom teachers before using them for teaching purposes. In some cases also, teachers kinescoped lessons during the regular semester. This enabled them to visit the receiving classrooms while their lessons were being shown and thus to gauge better the effectiveness of their lessons.

If further research bears out the hypothesis that television can make a contribution of such significance as to warrant it being given a permanent place in the school program, then it would seem logical that teachers should be trained to use the new medium effectively. This type of training might eventually become a part of the training given in Teacher Training Colleges. For the present, the provision of summer teacher training workshops attended by teachers on a voluntary basis, as at Hagerstown, would appear to meet the need.

Relative Suitability of Subjects for Television Teaching

A tentative finding of the Pittsburgh Experiment was that reading is inherently more suitable for presentation than Arithmetic. (p. 33) The results of the Halifax Experiment also supported the hypothesis that the teaching of Arithmetic by television poses problems of exceptional difficulty. In this experiment, 69% of the teachers involved in the teaching of Grade VIII Arithmetic believed

that the TV teaching of this subject had not been successful. (p. 102)

In a report on the Canadian Experiment carried out in 1954, the National Broadcasting Council suggested that experience to date had indicated that Social Studies and Science appeared to be particularly well suited to telecasting. This was further supported by the findings of the national Canadian Experiment conducted in 1956. (p. 86)

Of the three subjects taught by TV in the St. Louis Experiment, it was reported that the Science program had been most successful, followed by Composition and French in that order. (p. 62)

On the basis of the rather limited experimentation carried on in England, the consensus of expert opinion is that TV is particularly well suited to the teaching of Science, especially at the secondary level.

In the Manitoba Experiment carried out in 1958, the Literature program was judged to be more successful than the Science programs. (p. 97)

On the basis of the findings in the various experiments under review, it was generally agreed that those subjects are most suitable for television teaching which (a) best lend themselves to use of visuals, and (b) offer the best opportunity for lessons of the enrichment type.

Who Learns Best by Television?

In the Pittsburgh Experiment, it was found that the pupils in the lowest I. Q. range made the most exceptional gains in relation to ability. (p. 25)

In Philadelphia, teachers of slow learning pupils found that "students acquired facts and skills that they could not learn through Reading, and were not interested in acquiring by other means." (9, p. 78)

In Chicago, preliminary studies of high school students following a Physics course suggested that it is the "medium" student who profits most from television teaching. (9, p. 78)

A number of experiments have been cited by Kumato which make a strong case for the superiority of television instruction for low aptitude students. In the studies reported by Kumato, all groups profited from the use of TV, but the greatest relative gains were made by the low ability group. (38, p. 14)

Consideration of the very limited evidence available would seem to suggest that by comparison with the slower student, the superior student has less need of the assistance which audio-visual aids can give.

A possible alternative interpretation is that the superior student has been less stimulated by television programs which have been geared to the needs of the

average and below average pupil. It is probably true to suggest that the potential of TV teaching for superior students has never been explored more than superficially. The experiment now being carried on in San Francisco is an interesting but isolated attempt to determine the degree of usefulness of television in instruction of the gifted.

(p. 2)

Teacher Attitude

Only nine of the twenty classroom teachers involved in the Pittsburgh Experiment expressed a preference for continuing the programs the next year. Eight of the nineteen principals suggested that in future the general focus of TV programs should be changed from that of regular day to day teaching of subjects on the curriculum to one that would emphasize in-service training or enrichment programs. In general, the teachers and principals were lukewarm to the idea of using television to present any major part of the classroom program; they were comparatively receptive to its use on a limited scale for purposes of enrichment.

Only 20 to 28% of the teachers who returned rating forms on the Canadian Experiment of 1956 rated the teaching value of the various programs as high. Twenty-five per cent of the teachers favored continuing the programs while an average of 66% favored further experimentation.

The foregoing is sufficient to suggest that teachers have not accepted the new medium unreservedly. It is, of

course, quite possible that the attitude toward educational television will improve as technical problems are solved, and as further experimentation helps to clarify the precise nature of the contribution that television may be able to make.

Pupil Attitude

In the Pittsburgh Experiment, 71% of the pupils wanted the reading lessons continued. The corresponding percentages for Arithmetic and French were 63% and 55% respectively.

Over half of the students receiving TV instruction in the St. Louis Experiment thought that they would have learned more in the regular classes. Many students thought that the TV lessons were less interesting. Some stated that they missed class questions and discussion.

The majority of the students taking the correspondence-television instruction in Nebraska believed that the lessons so provided were more difficult than the traditional lessons. Less than one-third of the pupils taking the TV lessons stated that they enjoyed them more than regular classes.

On the other hand, it was found in connection with the Hagerstown Experiment that students in general prefer "live" instruction to TV instruction.

In the Manitoba Experiment conducted in 1958, it was found that student interest was generally well maintained throughout the TV lessons.

Although the Hagerstown Experiment provides the exception, it appears to be generally true that there is a considerable problem in regard to student acceptance of TV lessons where they are used for formal teaching of course material, but that there is relatively little difficulty where the TV teaching is used for purposes of enrichment as in Canada, France, and England.

CHAPTER V
FUTURE PROBLEMS
Technical Problems

Cost

The cost of operating educational television stations varies widely depending upon the nature of the studio and transmitting facilities, the type and amount of programming and other factors. Although there has been some reduction in costs in recent years, it is still true that the grim spectre of high cost has been a strong deterrent to the wider use of television programming in schools, particularly in smaller centers. However, with the advent of low power television, the outlook for the future has become much more promising.

For example, it has been stated that a minimal (low power) closed circuit operation with fifteen classroom outlets may be installed for approximately Seventeen Thousand Dollars. (36, p. 12)

A second example that may be cited is the closed circuit installation serving three rooms in the school system of Schenectady, New York, that was put into operation for Three Thousand Dollars. In this case, cost had been curtailed by the purchase of second hand receiving sets, by the use of the school's motion picture sound amplifier to provide the sound system, and by the purchase of an inexpensive vidicon camera with interchangeable lenses.

A somewhat more elaborate system for the same number of rooms was set up in Fort Chester, New York, for approximately Seventy-five Hundred Dollars.

While it would be unwise for school systems generally to follow a similar cost cutting policy in the purchase of equipment, it is interesting to note what may be accomplished by people imbued with a spirit of enterprise, who have expert technical advice to guide them.

Another report has made reference to two recent applications for low power educational television stations which show expected annual operating costs of Thirty Thousand and Thirty-five Thousand Dollars respectively.

Experience to date suggests that while the costs of educational television stations are well within the reach of larger cities, they still pose a major problem for smaller centers. Even low power stations are quite costly as the limited operational range (up to 25 miles) makes it impractical to have a number of centers share the costs of a single system.

Of course, it is logical to assume that costs will be reduced in succeeding years as production of equipment increases in volume and as technological advances are made. There is also the saving in costs that is likely to result from the discovery of new scientific principles. For example, it is likely that within a comparatively brief

time a way will be found to beam programs directly from one point to another over considerable distances without the use of costly relay stations. This is but one of the scientific advances that could have a tremendous effect in reducing educational television costs.

Future Improvement in Physical Conditions

A problem that received frequent mention in the studies reviewed, and one that will undoubtedly receive close attention in the future, is that of providing better physical conditions for the viewing audiences in schools.

In connection with the foregoing, Siepman has stressed the need for classrooms with good acoustics, good ventilation, up-to-date equipment and adequate indirect lighting.

(9)

L. P. Greenhill, Associate Director, Instructional Research Program, at Penn State University, has spelled the requirements out in detail as follows: (40, p. 55)

- "1. Ceilings and rear walls should be treated with acoustic tile."
- "2. Venetian blinds in channels should be provided to control exterior lighting."
- "3. Movable seats should be provided for maximum flexibility in seating arrangements."
- "4. Forced air ventilation should be provided and air conditioning is desirable."
- "5. Artificial lighting fixtures should be mounted against the ceiling (not suspended) to reduce reflections on television receivers. It would be desirable to wire these on several circuits so that the light

could be reduced to a level comfortable for television viewing (about twelve-foot candles)."

"6. It would probably be a help if some of the rooms had sliding walls so that two rooms could be combined to make one larger room. Green or cream walls appear to be most satisfactory."

"7. Finally provision should be made for ducts to carry coaxial and audio cables." (40, p. 55)

Greenhill also stated that where the size of the school system justified more than one originating room in a building, it was possible to send out a program from each originating room simultaneously over the same cable to any room in the building. Any one of the programs could be brought in to any classroom simply by tuning the receiver to the desired channel. (44, p. 54)

A highly controversial issue has been raised by Stoddard with his suggestion that no school (elementary or high school) should be built in the future without a sufficient number of large rooms to provide adequately for large group television instruction. (43, p. 52) This suggestion is based upon the philosophical tenet that large group instruction is not only feasible but advisable - a tenet that Canada, France, and England are not prepared to accept. It has been included here as indicating a trend in the United States, and also as an interesting example of the degree to which educational philosophy may influence such mundane things as plans for school construction.

Color Television

In two of the studies under review, (Canada and England), it was suggested that until color television was more fully developed, much demonstration work, especially in the Arts and Chemistry would be handicapped.

That there has been rapid progress made in the development of color television, is borne out by a recent article quoted by G. T. MacDonell in Manitoba School Television. The article referred to a series of medical demonstrations given recently on closed circuit television in England, and stated that "the color pictures were projected on a screen six feet by four feet and the results were excellent." (1, p. 3)

In view of the progress made to date, it is possible to look forward optimistically to the use of color television in classroom instruction within the foreseeable future.

Although the cost of color television is likely to be extremely high at the outset, and even prohibitive as far as classroom use is concerned, there is no doubt that the cost problem will be worked on and eventually solved.

Teaching Problems

The Problem of Staffing the Schools

Canada, France, and England are in agreement in believing that the answer to the teacher shortage is not

to be found in large group instruction, but rather in making teaching more attractive by the improvement of conditions within the profession itself.

On the other hand, the United States has done a great deal of experimentation in which "Master Teachers" have been used to give televised lessons to large groups of students with the purpose of effecting a saving in teacher personnel.

A typical plan for effecting such a saving has been given in a special report on closed circuit television, which outlined a plan for teaching 600 students with a staff of fifteen teachers. (35, p. 61)

During any particular half day, 300 pupils are in the regular classrooms studying such subjects as English, Reading, Writing, Arithmetic, Social Studies and the drill and technical sides of Art and Music. Of the other 300 students, 150 spend their first period in the "resources room". The remaining 150 are divided into two groups with seventy-five of them taking work in the auditorium, and seventy-five on the playground. Each of these larger groups is handled with one teacher and one aide. For the second period, the two groups on the playground and in the auditorium go to the resources room, and the students in the resources room break up into two groups of seventy-five each with one group taking over the playground, and

the other the auditorium. This same type of interchange goes on through the remaining two periods with the result that at the end of the half day, all students have had two periods in the resources room, and one each on the playground and in the auditorium respectively. Subjects taken during this half day are those which are deemed to lend themselves to large group instruction, e. g., Art, Music, Physical Education, Modern Languages, Library Usage, Safety and "many phases of regular subjects." (35, p. 60) For the second half day, the 300 students of this section interchange with the pupils who were in the regular classrooms.

There is considerable skepticism in this country regarding the possibility of success for any such type of organization which places one teacher in charge of as many as 150 pupils for even a part of the day. The likelihood of success is probably much greater where this type of thing is attempted on a very limited scale as in the junior high school experiment at Hagerstown.

Regardless of what the outcome may be, there is evidence of a firm resolve to test the hypothesis fully that with the aid of television, it may be possible to do the teaching job efficiently with fewer teachers. The idea behind the experimentation is boldly conceived, and the idea itself must not be rejected on "a priori" grounds. The issue will finally be decided on scientific findings based on comprehensive experimentation and research.

The Danger of Oversimplification of Teaching

Dale has sounded a warning as follows in regard to the possible danger of using television to oversimplify teaching:

"The restrictions of time and space (small screen) compel those who prepare programs to develop a visual-verbal shorthand different from that required by radio or films. A danger is that whenever one is forced to condense an explanation, it may be oversimplified." (15, pp. 200 - 201)

With reference to the first restriction mentioned by Dale, the writer has suggested that the error is frequently made of attempting to teach too much on television within a given time, and that an attempt is often made to compensate for this by over simplification of the material to be presented.

The need for such excessive simplification will be eliminated when it is found possible to organize the presentation of work in such a way that the difficulties of individual pupils may be met as they are encountered in class. A specific procedure planned to satisfy the foregoing need is outlined in the succeeding section.

The second restriction mentioned by Dale is much less serious than the first, and one much more readily removed since technically large screen projection is possible now, and the limitation on its use imposed by high cost is being made the subject of intensive scientific investigation.

Lack of Pupil Participation

A principal weakness of television teaching, as brought out in the various reports of experiments which have come under review, is the difficulty of securing adequate pupil participation in the lessons.

For example, the report of the St. Louis Experiment referred to the one way nature of the medium which is "an inherent weakness of television teaching", (p. 47), and suggested that further research should be carried out with reference to the problem. (p. 70) Similarly, in the report of the Pittsburgh Experiment, reference was made to the difficulty of providing for individual needs. (p. 38) The report of the Halifax Experiment in the formal teaching of Grade VIII Arithmetic also stressed the great difficulty in meeting the needs of pupils in Arithmetic on an individualized basis. How, then, is this problem to be solved in the future?

First of all, increased pupil participation may be secured by allowing the classroom teacher adequate time for suitably introducing the lesson, and for follow-up activities. Furthermore, in the case of lessons which offer special difficulty, which will usually be those involving the teaching of basic course material, it should be within the power of the classroom teacher to stop the televised portion of the lesson at the touch of a switch in order to raise or answer questions, and to offer such

supplementary information as her close knowledge of the class might indicate to be necessary. It would also be necessary that the program should be presented to the class at the appropriate time with regard to the learning process without being subjected to the dictates of an arbitrary schedule.

Of course, freedom of the type envisaged would be possible only through the use of kinescope recordings used over a closed circuit system. This would entail a small loss in aural and visual quality as compared with "live" presentations, but this would be a small price to pay for the greater freedom of use which would be made possible, and which would seem to be essential to effective classroom teaching.

In presenting lessons of the enrichment type, there would be little if any need to interrupt the continuity of the television presentation. In this case, the need for interaction between teacher and pupils could be met adequately in the time allowed for introduction and follow-up of programs.

An approach such as that suggested might make it possible for a good teacher to make classroom instruction more meaningful to her students generally. It might also make it possible to challenge students, particularly students of high ability, to assume greater self-responsibility for learning, while at the same time making it possible to

provide the needed supplementary assistance for those less able.

Conclusion

The note on which this review is to be concluded is one that re-emphasizes the importance of the classroom teacher in education:

"Education is more than the transmission of facts, principles and motor skills. It is also guidance in social and emotional development, in growth in maturity...All this takes place in inter-personal relationships in which good teachers must always play a critical role. What it may and should achieve is that wide use of television instruction will free much time of many teachers and scholars for closer, more personal contact with students, and for research. "

(10)

BIBLIOGRAPHY

Articles

1. "Adventure in Television", Manitoba School Television, Queen's Printer, Winnipeg, Manitoba, 1958.
2. "Closed Circuit Project Notes", The Hagerstown Project, Production Principles, ETV Research Fact Sheet Service, Series II, Number 10, January 7, 1957.
3. "Closed Circuit Television", The Hagerstown Project, Production Principles, ETV Research Fact Sheet Service, Series II, Number 13, May 24, 1957.
4. Engar, Keith M. "National ETV in France", The NAEB Journal, October, 1957.
5. Gilliland, Susan. "ETV in England", The NAEB Journal, October, 1957.
6. Greenmeyer, Paul A. and Iglehart, Louis T. "TV and the Crisis in Education", The St. Louis Project, The Effectiveness of Television as a Teaching Tool. Broadcast News, Volume 91, October, 1956.
7. Moser, Jean. "Television and the Classroom Teacher", The Hagerstown Project, Administrative and Faculty Reactions to Educational Television and Radio, ETV Research Fact Sheet Service, Series VII, Number 5, October 1, 1957.
8. Newburn, H. K. "Television and the Future of Education" The Educational Forum, May, 1958.
9. Slepman, Charles A. "The Case for TV in Education", The New York Times Magazine, August, 1957.
10. "Television in Washington County Schools, Hagerstown, Maryland", NAEB Research Fact Sheet Service, Series I, Number 40, March, 1958.
11. Ulrich, John H. "An Experimental Study of the Acquisition of Information From Three Types of Recorded Television Presentations", ETV Research Fact Sheet Service, Series II, Number 11, March 13, 1957.

Books

12. Anspiger, V. C. Measuring the Effectiveness of Sound Pictures as Teaching Aids, Contributions to Education, Number 565, Teachers College, 1933.
13. Bailey, K. V. The Listening Schools, BBC Publications, London, England, 1958.
14. Chambers Encyclopedia, George Newness Ltd., London, England, 1950, (p. 758 - 759).
15. Dale, Edgar. Audio-Visual Method in Teaching, Revised Dryden Press, N. Y., 1954.
16. Dent, Ellsworth C. The Audio-Visual Handbook, Society for Visual Education, Inc., 1939.
17. Kinder, James S. Audio-Visual Materials and Techniques, American Book Company, N. Y., 1950.
18. McKown, Harry C. and Roberts, Alvin B. Audio-Visual Aids to Instruction, McGraw Hill Book Company Inc., N. Y., 1940.
19. Monroe, Walter S. Encyclopedia of Educational Research, MacMillan Company, N. Y., 1952.
20. Newsom, Carroll V. A Television Policy for Education Proceedings of the Television Institute under the Auspices of the American Council of Education, April 2 - 24, 1952.
21. Rivlin, Harry N. and Schueler Herbert. Encyclopedia of Modern Education, The Philosophical Library Inc., N. Y., 1943.
22. Siepman, Charles A. TV and Our School Crisis, Dodd Mead and Company, N. Y., 1958.
23. The National Encyclopedia, P. F. Collier & Son Corporation, Volume VII, N. Y., 1946.
24. Wittich and Schuller, Audio-Visual Materials, Their Nature and Use, Harper and Brothers, N. Y., 1953.

Miscellaneous

25. An Analysis and Evaluation of a Television Demonstration of the Teaching of Fifth-Grade Reading, Arithmetic, and French, Report of the Board of Public Education, Division of Curriculum Development and Research, Volume XXXI, March-June, 1957.
26. An Investigation of Television Teaching Conducted by the St. Louis Educational Television Commission and the St. Louis Public Schools, First Report, September, 1956. Supplementary Report, February, 1957.
27. An Investigation of Closed Circuit Television Teaching for University Courses, Conducted by the Division of Academic Research and Services at Penn State University, 1958.
28. Antenna, Volume 1, Number 5, A News Bulletin About Television Published for the Saskatchewan Television Committee by the Adult Education Division, Department of Education, Regina, Saskatchewan, January, 1959.
29. A Report Concerning the Use of Closed Circuit Television, Report of Experiment Carried out by Scarborough, Ontario Board of Education, Department of Audio-Visual Instruction, November 4 to 8, 1958.
30. BBC Sound and Television Broadcasts to Schools, Pamphlet Published by the CBC for 1957-58.
31. BBC Sound and Television Broadcasts to Schools, Published by the CBC for 1958-59.
32. BBC School Television Broadcasts, 1958-59. Notes to Supplement the Annual Program of BBC Sound and Television Broadcasts to Schools.
33. BBC Television Broadcasts to Schools, Mimeographed Material Issued to Schools by the School Broadcasting Council for the United Kingdom, 1958.
34. Can TV Link Our Home and School?, Report by the CBC, 1954.
35. Closed Circuit Television, A Special Report, School Management Magazine, March, 1958.
36. Educational Television and the Schools, A Report Published by the Educational Television and Radio Center, Ann Arbor, Michigan, January, 1958.

Miscellaneous

37. Evaluation of Closed-Circuit Educational Television, Pilot Project at Faculty of Education, Edmonton, March 17, to March 28, 1958.
38. Kumata, Hideya. An Inventory of Instructional Television Research, Educational Television and Radio Center, Ann Arbor, Michigan, December 1, 1956.
39. La Television Scolaire, Institut Pedagogique National, 29 Rue d'Ulm, Paris, France, 1958-59.
40. Recherches Sur Les Emissions de Television Scolaire, Deuxieme Serie, R8, being a Report of the French Ministry of Education on Experimentation Carried out in France in 1956-57.
41. Report on the Experiment in Teaching by Television in the Halifax Public Schools, Issued by the Halifax Board of School Commissioners, 1958.
42. Research Report, Number 581, The Educational Television and Radio Center, Ann Arbor, Michigan, July 31, 1958.
43. School Television in Canada, CBC Report of the Canadian National Experiment carried out in April - May, 1956.
44. Stoddard, Alexander J. Schools for Tomorrow, The Fund for the Advancement of Education, N. Y., 1957.
45. Teaching by Television, A Report Issued by Metropolitan Pittsburgh Educational Television Station WQED, Pittsburgh Pennsylvania, Undated, Deals with Experimentation in the years 1955-57.
46. Television in the Classroom, CBC Report of the first National Canadian Experiment Carried out in November, 1954.
47. "The Hagerstown TV Project - A Preliminary Report", International Education Seminar, October, 1957.
48. The Nebraska In-School Television - Correspondence Study Program, A Progress Report for 1957-58, Issued by the University of Nebraska, University Extension Division Lincoln, Nebraska, 1958.

Miscellaneous

49. Lambert, R. S. Notes on the Hagerstown Experiment being a report on the International Educational Television Seminar at Boston University held in October, 1957.
50. The Nebraska In-School Television - Correspondence Study Program, A Progress Report for 1956-57, Issued by the University of Nebraska, University Extension Division Lincoln, Nebraska, 1957.

APPENDIX A - Part I
STUDENT QUESTIONNAIRE
St. Louis Experiment

You have completed nearly one semester's work in General Science and English Composition using television as the medium of instruction. There are many things which must be taken into consideration in determining the value of television used in the schools in this manner. One of these things is the reaction of students to the process.

It will be of great help to us if you will consider each question carefully and write your responses as fully and honestly as you can.

1. Do you think you have learned as much over television as you would have in a regular classroom, taught by the same teacher?

_____ much more
_____ a little more
_____ about the same
_____ a little less
_____ much less

Why? _____

2. Do you think that the course has been more or less interesting than it would have been if it were taught in a regular classroom in the usual way?

_____ much more interesting
_____ a little more interesting
_____ about the same
_____ a little less interesting
_____ much less interesting

Why? _____

3. From your point of view, compare television and regular classroom instruction.

Principal advantages of television: _____

Principal disadvantages of television: _____

APPENDIX A - Part II
SUPERVISING TEACHER DAILY REPORT
St. Louis Experiment

School _____ Teacher _____
Subject _____ Date _____

The items listed below are suggested as a guide in making your daily comments.

The numbers to the right of any item may be considered to be a five-point scale, as follows: 5 - excellent; 4 - good; 3 - average; 2 - poor; 1 - unsatisfactory.

I. Estimate of the overall quality of the lesson 5 4 3 2 1

II. Detailed evaluation

1. Gearing of the lesson to the ability of the students 5 4 3 2 1

2. Organization of the lesson

a. Effectiveness of the opening of the TV lesson 5 4 3 2 1

Comment _____

b. Major presentation 5 4 3 2 1

Comment _____

c. Effectiveness of the close of the TV lesson 5 4 3 2 1

Comment _____

3. Significance of the content

Very important ___ Of some importance ___

Not important ___

Comment _____

APPENDIX A - Part II (continued)

4. Quality of the material covered
Too much____ About right____ Too little____
Comment_____
5. Assignment (Clarity, quantity, etc.) 5 4 3 2 1
Comment_____
- III. Apparent student interest in the lesson 5 4 3 2 1
Comment_____
- IV. Reproduction on screen of visual materials (films, filmstrips, pictures, etc.) 5 4 3 2 1
Comment_____
- V. Camera work - was the camera on the right spots? 5 4 3 2 1
Comment_____
- VI. Characteristics of the TV teacher
1. Personal appearance
Comment_____
2. Mannerisms
Comment_____
3. Voice and diction
Comment_____
- VII. If the reception was unsatisfactory, indicate the nature of the difficulty and the cause, if known.
Comment_____
- VIII. Interruptions which disturbed the lesson
Comment_____

APPENDIX A - Part II (continued)

IX. Portion of lesson that should be repeated

Why? _____

X. General Comment - classroom conditions, student morale, etc.

APPENDIX B

THE HALIFAX EXPERIMENT, 1958

Results of Questionnaire

Section I

Section I of the questionnaire dealt with viewing conditions, and brought out the following salient points:

1. That 83% of the viewing was done in regular classrooms.
2. That the average size of the viewing class was thirty-seven.
3. That 78% of the classes used a 21-inch screen. Five percent used a larger, and the balance a smaller screen.
4. That only 63.4% reported that the picture was clear from all parts of the room.
5. The majority of teachers believed that the maximum number of pupils that could be effectively served by one TV set was thirty to thirty-five.

Section II

TABLE XXI

The Percentage of Teachers in Each Grade Who Gave Affirmative Responses to the Following Questions.

Questions on Curriculum	IV	VI	VIII	Total
1. Was the subject matter suited to the grade level	73%	93%	78%	77.5%

TABLE XXI (continued)

Questions on Curriculum	IV	VI	VIII	Total
2. Were these lessons given at the appropriate time of year to conform to your teaching?	80%	-73%	29%	66%
3. Did the pupils have a satisfactory background for these lessons?	70%	85%	94%	83%
4. Were the lessons well planned?	81%	81%	93%	81.5%
5. Were the purposes of the lesson clearly understood by the class?	81%	81%	93%	81.5%
6. Was there a logical arrangement of subject matter?	-	-	-	97.6%
7. Were the points clearly explained?	93.5%	65%	71%	77%
8. Did the teacher sum up at end of each lesson?	-	-	-	88.6%
9. Were the main points clear enough to be easily remembered? Of the negative answers, 69.6% were from Grade VI.	-	-	-	70%
10. When the second and third lessons were given, were your pupils up-to-date on the preceding lessons?	-	-	-	97.5%
10 (a) Had the review been directed by you?	-	-	-	93.5%
11. Did the teacher recall the main points of preceding lessons before going on?	-	-	-	96.3%
12. Did the third lesson round out the series?	-	-	-	91.3%

TABLE XXI (continued)

Questions on Curriculum	IV	VI	VIII	Total
13. Would you anticipate any difficulty in scheduling a series of lessons to correlate with classroom teaching over an extended period?	45%	41%	59%	67.6%

Section III

Questions on Visuals

1. Omitted.				
2. In general did the visuals illustrate suitably the points for which used?	-	-	-	85%
3. Did the visuals draw attention away from main points of lessons?	-	-	-	5.4%
4. Judging by student reaction, should more use have been made of visuals?	23%	52%	43%	36.5%
4 (b) Omitted.				
5. Do you think that greater use of visuals would improve teaching in regular classrooms?	-	-	-	94.4%
6. Were visuals displayed long enough?	43%	44%	64%	51.3%
7. How could visuals be used more effectively?				

The suggestions received are summarized as follows:

- (a) Writing on blackboards must be large and clear, and shown for a long period, especially in lower grades.
- (b) Limited space restricts the effectiveness of Science demonstrations. Overall view as well as close-up of demonstration is required.

TABLE XXI (continued)

Questions on Curriculum	IV	VI	VIII	Total
(c) Maps should be larger and close-up used to show detail.				
(d) In the display of maps and charts, broader and deeper lines should be used. At times the visuals could not be distinguished from the object on which they were resting.				
(e) Visuals could be shown longer with an explanation given while the visual is in view.				
(f) Cover less material on the TV lesson with fewer visuals, but show the visuals more frequently and for longer periods.				

Section IV - Mechanical

1. Did the cameras catch the teacher's facial expression?	-	-	-	88.6%
2. Were the cameras able to focus on the teacher and on the visuals so as to keep both in proper perspective?	-	-	-	64.9%

Section V - Pupil Response

1. Did the lessons catch the attention of the pupils immediately?	97%	68%	69%	78%
2. Was the interest of the pupils sustained through the lessons?	50%	43%	52%	44%
3. Did the pupils appear to concentrate sufficiently?	68%	55%	52%	58%
4. Was there a greater tendency than usual for attention to wander?	44%	52%	59%	45.5%

TABLE XXI (continued)

Questions on Curriculum	IV	VI	VIII	Total
5. Did you notice any indication during the lesson of the need of pupils to ask questions?	57%	74%	54.5%	60.5%
6. Do you feel that the foregoing detracts seriously from further development of the lesson?	60%	77%	75%	69.2%
7. Did you test after each lesson for retention of material?	-	-	-	87.4%
8. If so, was the retention rate (a) high (b) low? Percentages giving high ratings are:	54%	30.5%	90%	41.8%

Section VI - General

1. Do you believe that this type of teaching is effective?	85%	58%	31%	55.9%
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APPENDIX C

Appendix "C" is made up of sample copies of two pamphlets supplied through courtesy of the BBC.

The first pamphlet consists of Notes for the Teacher on Unit I of the topic entitled "Mammals in Britain". This pamphlet supplies background information that may be used by teachers for introductory and follow-up purposes.

The second pamphlet is the corresponding pamphlet which is placed in the hands of the students themselves.

BBC TELEVISION FOR SCHOOLS

A small, light-brown mouse is perched on a green branch, surrounded by several bright red berries. The mouse is facing right, and its whiskers are visible. The background is dark and out of focus.

Mammals in Britain



Mammals in Britain How Animals Move



The group of animals known as mammals includes such creatures as cats, dogs, horses, elephants, bats, whales, and human beings. They all have warm blood and hair on at least some part of their bodies, and they all have young that are born alive and that feed for some time after birth on their mothers' milk. There are about fifty different kinds of land mammal found wild in the British Isles, and if we include the

whales and some of the rarer seals found round our coasts, the total is about eighty. Yet apart from animals like rabbits, squirrels, mice and deer, you rarely have the chance to see many of them. This is because a large number only come out during the hours of darkness and nearly all of these are shy and really expert at hiding themselves away from us.

Certain groups of mammal are specially adapted to different ways of living. Think of some of the wild ones that you know already and ask yourself how they live. Do they move around in the daytime, or at night, or both? Do they have their homes below the ground, on the surface, or in trees? Do they hunt for food in the air, the water, or on land? How many eat plants, or insects, or fish, or other mammals?

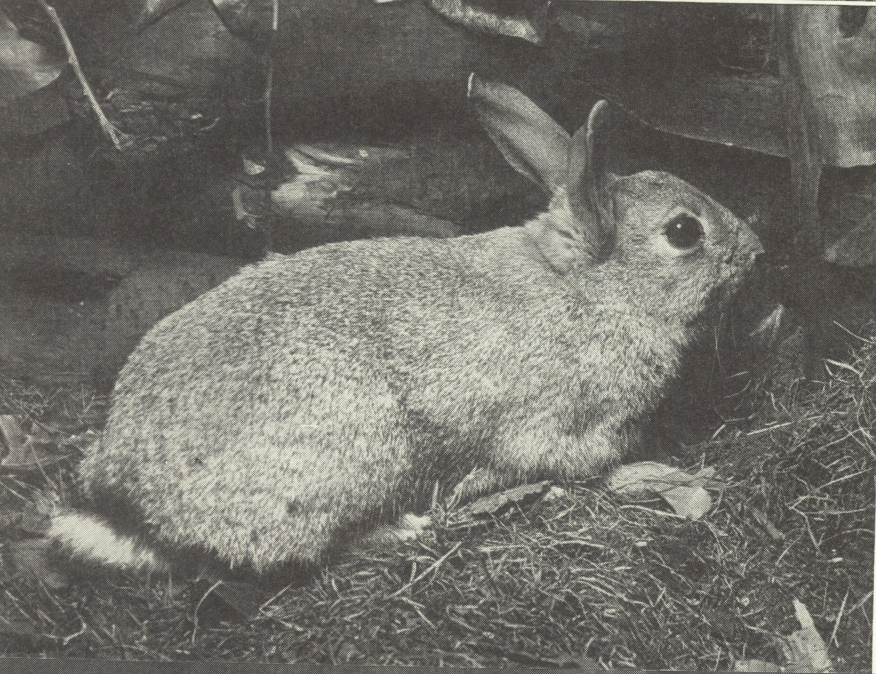
The badger digs his home underground and nearly always comes out only at night. Squirrels are specially adapted for life in trees and build their nests in the branches. Grey seals spend most of their lives at sea, while bats can hunt upon the wing.

The first unit of programmes this term shows how one group of animals, the mammals, is adapted to various ways of life – on and under the ground, in the treetops, in water, and in the air. In this second unit you will meet many other animals in addition to mammals. Wherever it lives, an animal needs to move, in order, for example, to find food or to escape from its enemies. Its body may be modified in many different ways to enable it to move easily in its surroundings; there are various methods of swimming in water, of burrowing in the soil, climbing, leaping, gliding, and flying. Try to observe as many animals as you can – cats and dogs, birds, frogs and their tadpoles, flies and other insects, worms in the garden – and notice how they move. In some cases you may be able to time their speed.

Don't forget to keep a notebook with your observations in it. You may not be able to identify all the creatures you see, but there are many well-illustrated books which should help you here; there are probably some in your school library, and your local reference library will also be able to help you. Another thing you should do is to try your hand at making simple outline drawings of the animals you see. Don't put in a lot of detail; try to show just one feature connected with movement – the stream-lined shape of a fish, for example, or the wavy outline of a worm wriggling over the grass. And always remember to add the date and the place.



The photograph on the front cover shows a dormouse and that opposite a woodmouse; both are slightly larger than life size.



Mammals in Britain

INTRODUCING MAMMALS

12 January (16 January)

Mammals are usually thought of as the most advanced creatures alive on the earth. They have larger brains and higher intelligences than fishes, amphibians, reptiles, or birds. Amongst all the animals with backbones mammals show the greatest care in looking after their young.

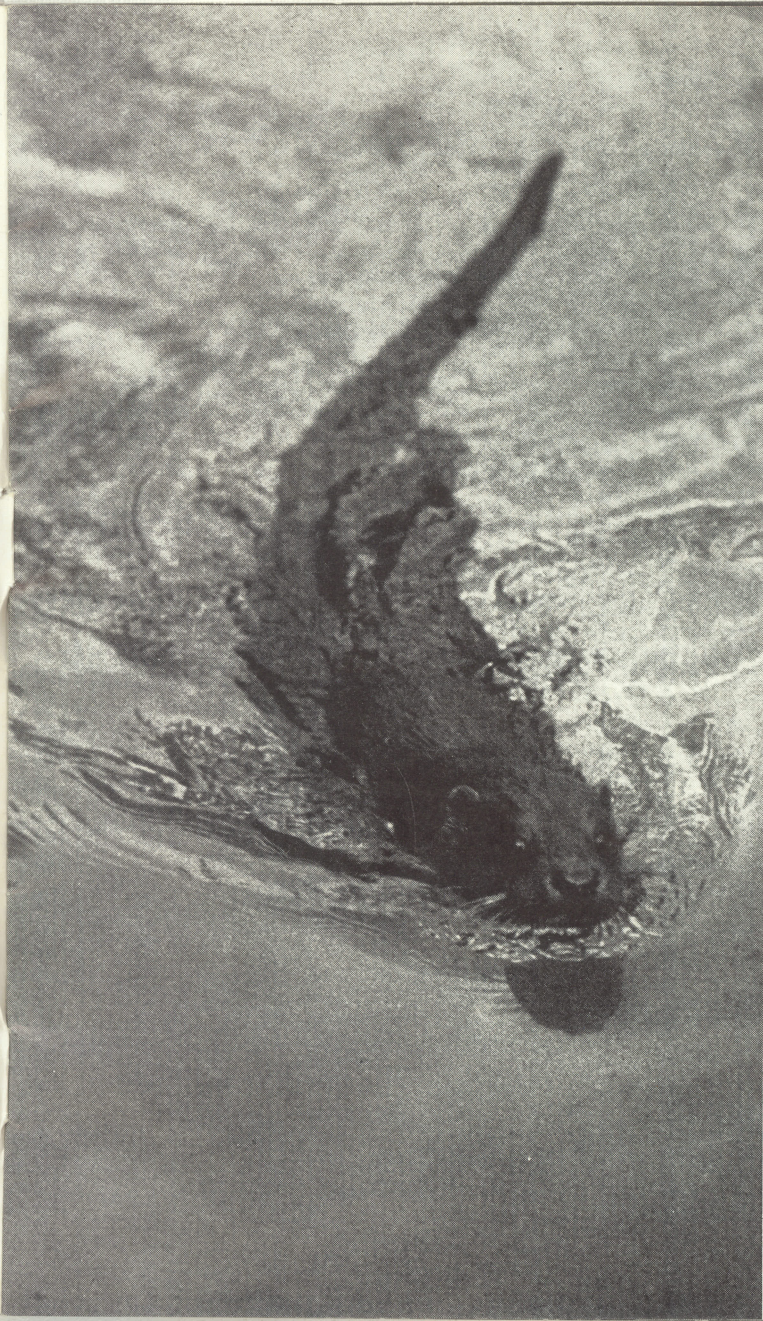
British mammals belong to seven main groups. Members of three of these groups are shown on this page and on the page opposite. The mammal on the left belongs to the group of Insect-eaters; this one has specially adapted fur – it is, of course, a hedgehog. Its close relations include shrews and moles. One of the biggest groups, which includes the wood mouse – shown slightly larger than life inside the front cover – is the Rodents or Gnawing Animals. In this group are the other kinds of mice as well as rats, voles, and squirrels.

The rabbit on the left is a member of a different group with very powerful hind limbs. Can you find another mammal in the pamphlet which is a close relative of the rabbit?

Some of the British mammals belong to the Carnivores, or Flesh-eaters. The two otters opposite are hunters of fish and, like the seals, are specially streamlined for living in water. Foxes, badgers, and stoats are also Carnivores.

The three remaining groups are the Hoofed Animals, such as deer, the group which includes porpoises, dolphins and whales, and finally the Bats. There is a picture of a greater horseshoe bat inside the back cover.

Try to make a collection of photographs and sketches of as many different members of these seven groups as possible.



BADGERS 19 January (23 January)

Badgers are very difficult mammals to study for they are extremely shy and generally only come out at night. In the daytime they sleep in tunnels far below the ground and can live unnoticed for many years even close to towns. The badger is quite common in many parts of Great Britain but may often be overlooked. One of the clues to its presence may be tufts of coarse black and white hairs caught on bramble twigs, or even, as in the picture on the right, on strands of barbed wire. Other clues may be pad-marks, scratched tree-trunks, or the tunnels into its underground home.



The picture opposite shows an adult badger returning to its sett after a night's feeding. Notice the short, strong legs, so useful for digging, and the little tail. Look carefully at the stones turned out by the badger from its tunnel. This photograph was taken at night by means of a flash light.

Other features of badgers are the broad white stripe from the top of the head to the nose, and two black bands from the ears running through the eyes. A full-grown badger is about three feet long and may weigh as much as forty pounds.

The young, known as cubs, are born between late January and March deep in an underground chamber. The three cubs on the left are about four weeks old and were photographed after being removed for a short time from the sett.

Try to find out if there are any badgers living near your home.

The old name for the badger was Brock. Do you know of any towns or villages whose names show that there might have been a badgers' sett nearby?



SQUIRRELS

26 January (30 January)

There are two kinds of squirrel to be found in Britain. The picture left is of the native red squirrel with its tufted ears and long, furry, bushy tail. Opposite is the larger American grey squirrel which has been released in Britain and is often the better known animal of the two.

Squirrels are probably the easiest of all our wild mammals to watch. They are about in the day time, and can often be seen, running and leaping in the trees, or sitting with their tails curled up their backs, and holding a nut, or other piece of food, in their front paws.

The red squirrel is specially fond of pine woods and this is where you should look for it. In some parts it is quite common but in others it is scarce. The grey squirrel is not so fond of pines and prefers woods with beech trees. It is common in southern England, Devonshire, the Midlands, Yorkshire and Durham. It lives in a few places in Scotland and is still spreading. Although the grey squirrel spends more of its time on the ground, both kinds are specially adapted for climbing; look at the shape of their feet. They can spread their legs and tail to make long jumps from branch to branch.

Squirrels build nests, called 'dreys', usually high in a tree. They are made of twigs, with a lining of leaves, moss, and feathers. When you are in the country, keep your eyes open for these 'dreys'. They often look very much like a magpie's nest but they do not have definite entrances; the squirrels just push their way in and out.





SEALS

2 February (6 February)

Seals when swimming are the most rapid and graceful of all mammals for, with their long, fish-like bodies, they are really at home in the sea. On land they are very clumsy and have to shuffle along on their front flippers, dragging their back feet behind them; the body is pushed forwards in a series of jerks.

All seals have hairy, waterproof coats and a thick layer of fat under the skin to keep them warm in very cold water. This layer of fat is known as blubber. They come ashore only to breed, and may be on land for as little as four weeks in the year.

The kind of seal you are going to meet in today's programme is the grey seal. Grey seals are the rarest kind in the world but more than half of them breed in the British Isles. The seals come ashore in the autumn to some of the rocks and islands off the west coast of Britain and to the Farne Islands on the east coast of Northumberland. In the picture on the left you can see a female, or cow, grey seal sheltering her young one, called a pup, from the sea. The right-hand picture shows a fortnight-old pup with its silky white coat and sad-looking eyes.

Seals are often very inquisitive animals and they can be attracted to a boat by the sound of a mouth-organ. They also have strange voices and the cows can often be heard 'singing' in choruses.





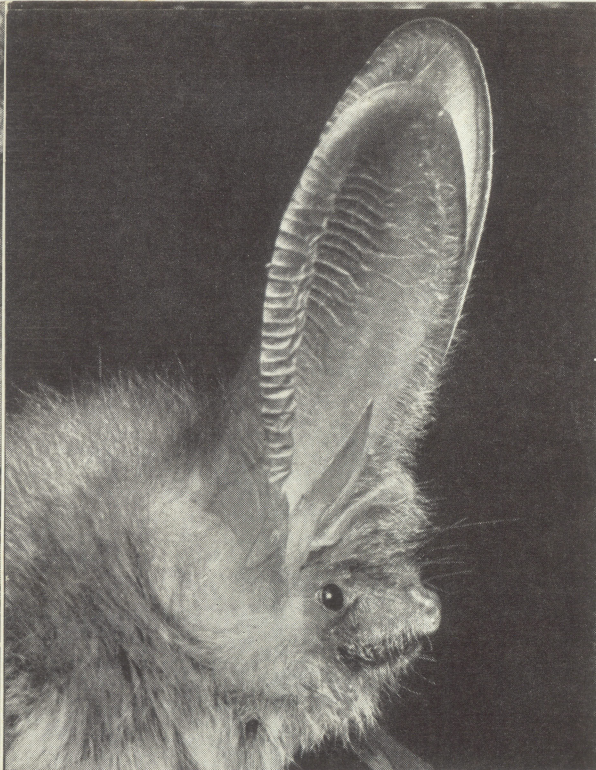
B A T S 9 February (13 February, *Half term repeats* 16 February, 20 February)

When daylight fades into dusk the bats come out from their sleeping places in hollow trees, caves, eaves, and belfries, and fly around in their search for insects.

Bats are, of course, the only flying mammals in Britain – in fact, in the world – and if you look at the picture of the greater horseshoe bat in flight at the end you will be able to see some of their special features. Notice how the skin of the bat's wing includes within it the bones of the arm and hand, the leg (but not the foot) and the tail. The larger bones that hold open the membrane of the wing look a bit like the spokes of an umbrella. See also how long the fingers have become and how the thumb has developed a strong hook by means of which the bat can hang from a rough surface or move on the ground.

There are thirteen kinds of bat known in Britain and five of them are shown in the illustrations. On the left is a long-eared bat. It has a wing-span of about ten inches and is one of our commonest bats. Leisler's bat (*bottom left*) is a strong flier but is only on the wing for about an hour in the evening. Natterer's bat (*bottom centre*) has a slow, steady flight and often flies early in the evening. The bat showing its teeth (*bottom right*) is the serotine; this is a large bat with a wing-span of fifteen inches. It eats large numbers of beetles, and has sharp, strong teeth which can bite through the hard wing-cases. These pictures are all about twice life size.

All bats hibernate throughout much of the winter in sheltered places, and in the picture opposite you can see a group of greater horseshoe bats hibernating in a Dorset cave.



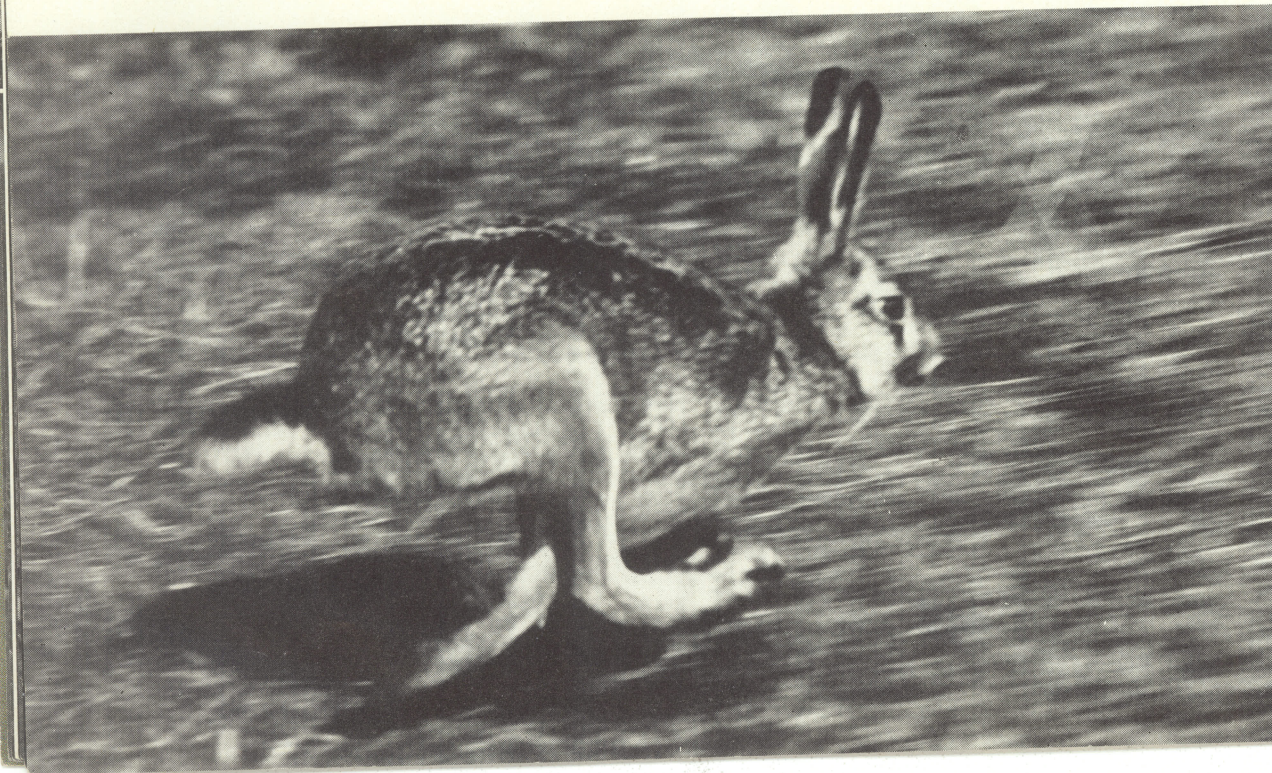
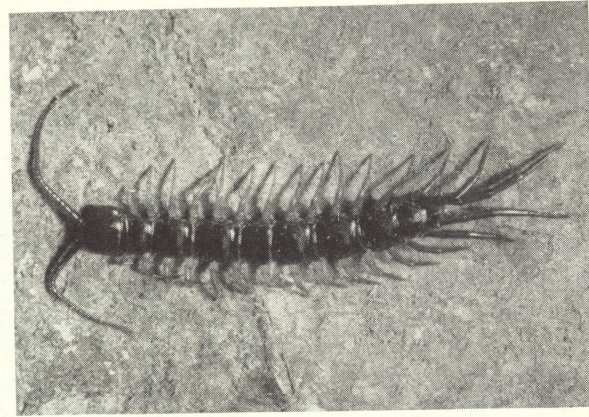


How Animals Move

ARMS AND LEGS 23 February (27 February)

The mammals you have been hearing about during the first half of this term all use their four limbs for getting about, though the actual shapes of the limbs may be very different from the arms and legs we ourselves possess. Have another look at the pictures of seals and bats, for example, and try to work out the likenesses and differences between their limbs and yours.

The animal in the picture below is a hare. This photograph was taken when it was moving at very high speed. Notice its very powerful hind limbs, and how these are brought on either side of the fore limbs with every leap that the creature makes. How many other animals can you think of which move by leaping?



In today's programme you will hear not only about the use mammals make of their limbs, but also about some animals that move on legs of a very different kind. The picture above shows a centipede. The name means 'a hundred feet' - how many can you count?

There are many different kinds of centipede. You can tell centipedes from millipedes (what does this word mean?) by the fact that centipedes have one pair of legs on each segment of their bodies, whereas millipedes have two pairs.

Look through this pamphlet and see how many different ways of using hands and feet you can find illustrated. Look at the foot of your dog or cat at home and compare it with your own hand or foot.

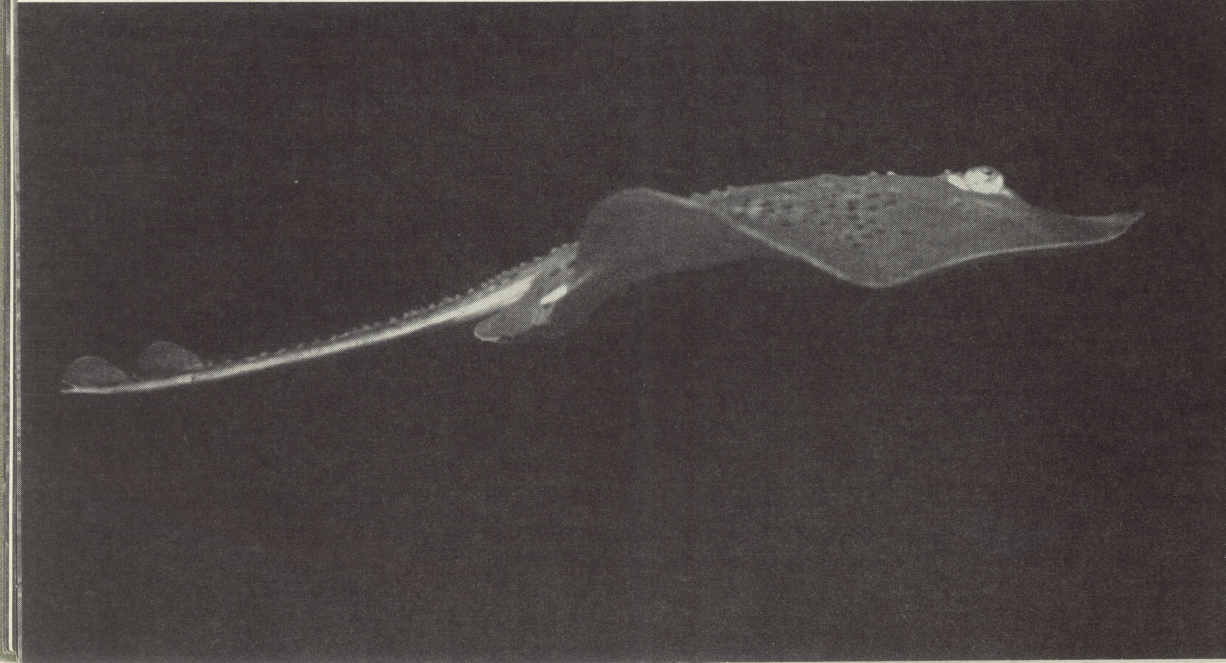
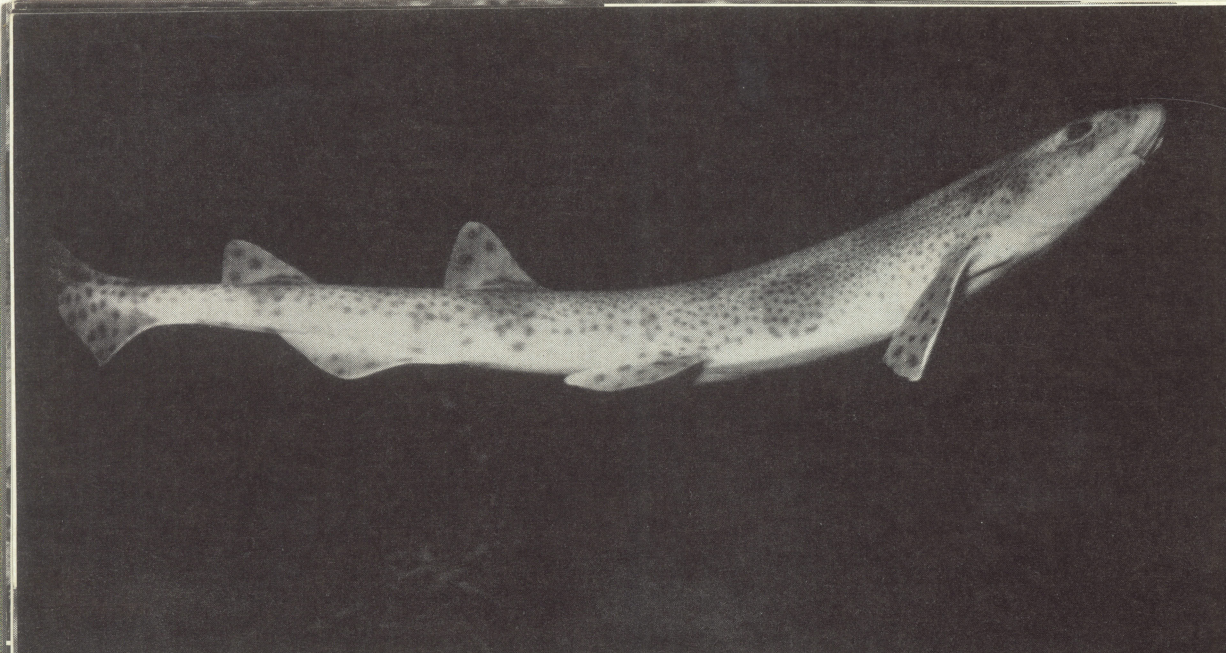
Here are two animals that spend most of their lives in the tree-tops. The picture on the right shows a koala, and that below a sloth. Do you know which countries these come from?

The sloth spends much of its time hanging upside down from a branch. Can you see how its limbs are specially adapted for this? What else is its 'hand' useful for?

Compare its hands and feet with those of the koala, which are very much more like our own. There is, however, one very important difference between your hand and a koala's; try grasping the branch of a tree with your left hand and you will easily spot the difference.



Turn this page upside down. Would either of these animals be able to move easily the other way up in the treetops? Try to collect some more pictures showing the different ways that animals - including human beings - use their arms and legs when they move. In many ways man is the most adaptable of all animals in this respect. He can walk, run, leap, climb, and swim - but in spite of many attempts at attaching wing-like objects to his arms he has not yet been able to imitate the bats. He has, however, invented machines for flying instead of using his own limbs.



MOVING IN WATER

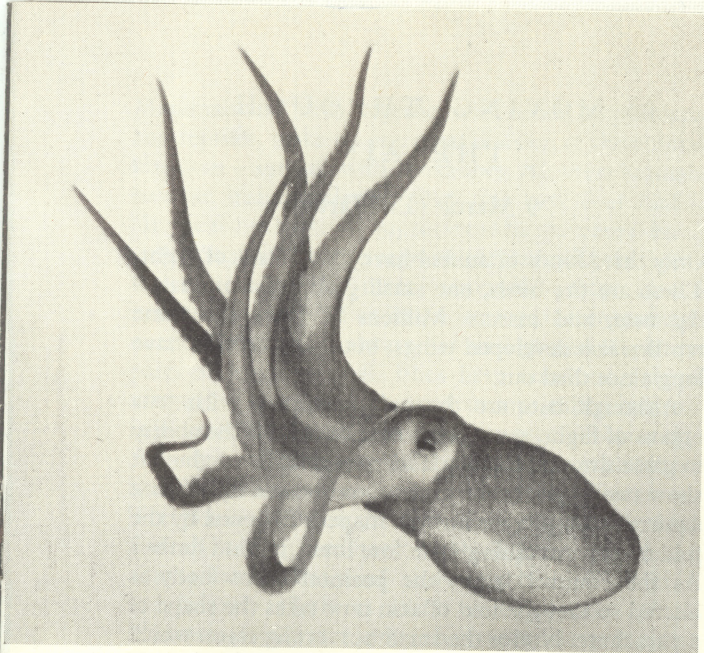
2 March (6 March)

If you have ever watched fish such as trout swimming in a river, or if you keep goldfish in an aquarium at school or at home, you have probably noticed that they use the whole of their bodies in moving through the water in a series of wavy motions. The fins may also help in swimming, but their main use is to help in steering and in the smaller movements.

Fishes have two pairs of fins. One pair is just behind the head; these correspond to our arms. Another pair some way down the body correspond to our legs. There are in addition un-paired fins along the back and on the under-side.

The top picture on the left shows a dog-fish swimming. Notice its stream-lined shape.

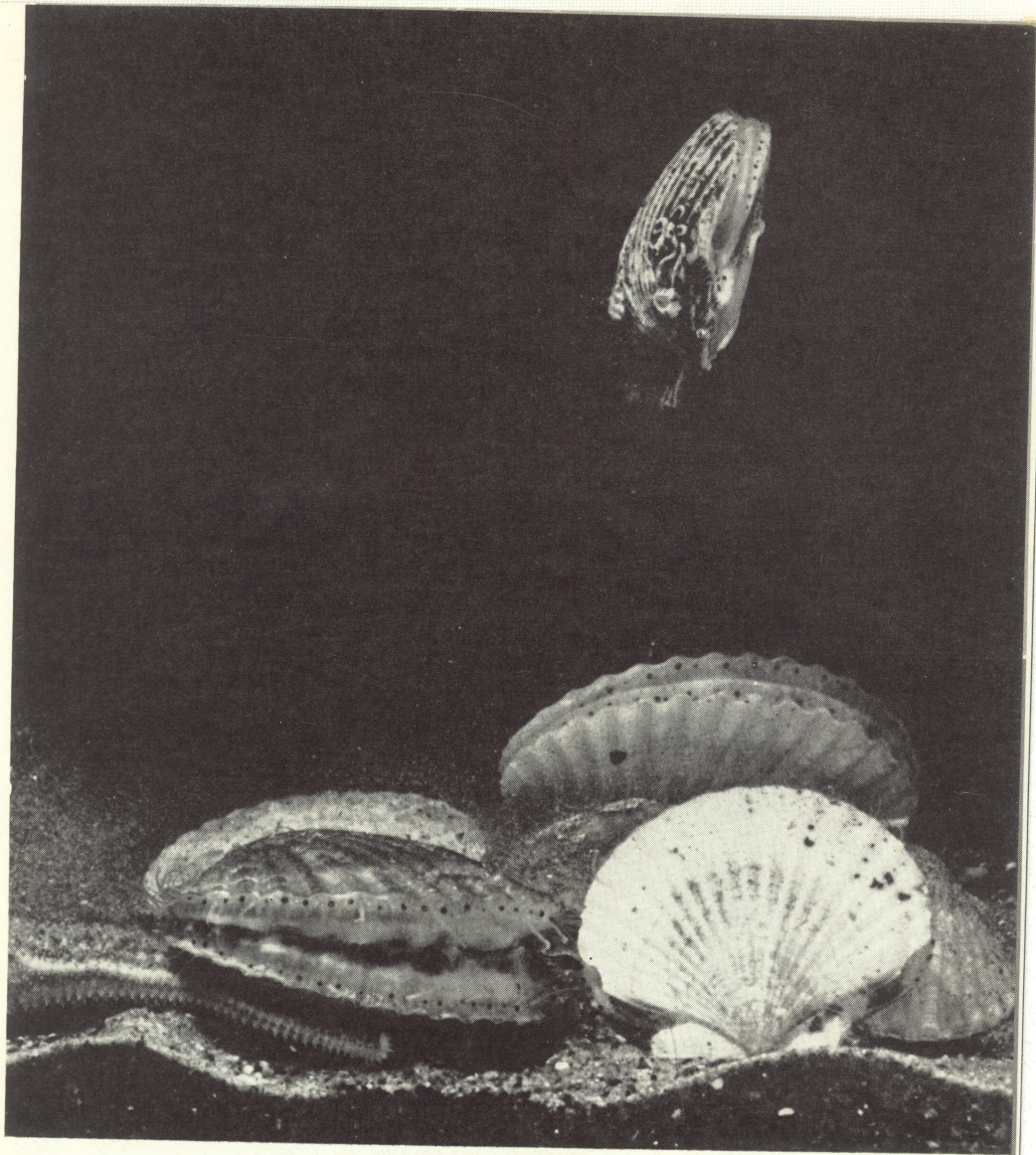
The other photograph shows a very different kind of fish. This is a thornback ray. Its body is flattened out like a large plate. It swims through the water by wave-like up-and-down movements of its flattened body.



The octopus, shown above, has two methods of getting about: it can crawl with its tentacles, each of which is covered with suckers on the underside, and it can swim using jet propulsion. You can see that there is a kind of bag at one end of its body. This is filled with water which is then suddenly squirted out through an opening just below the creature's eye. The water moves one way and the animal the other.

The scallops in the picture on the right flap their way through the water. They are escaping from the star-fish whose tentacles you can just see on the left.

If you are able to visit the London Zoo try to spend some time in the aquarium, and notice how the fish and other water animals use their bodies as they move.



MOVING THROUGH THE AIR

9 March (13 March)

Only three kinds of animal have true organs of flight. These are the birds, one small group of mammals – the bats, and insects. Millions of years ago some reptiles also developed wings, but flying reptiles have long since died out.

Although bats are the only mammals with true organs of flight, some other mammals have the ability to glide through the air. The photographs on the left show two stages in the gliding jump made by a flying squirrel. Can you see how its shape is flattened by the fold of skin stretching from fore limbs to hind limbs? As the squirrel lands, the position of its body is altered so that the fold of skin now takes the shape of a parachute. Notice the small but strong claws which enable it to land on the upright tree trunk.

Compare the flying squirrel with the bat shown in flight. In the bat's wings the fold of skin is not covered with hairs, and it is supported mainly by the very elongated fingers of the hand. But there is also a part which stretches from the fore limb to the hind limb. The hind feet are free and used in grasping. If your local Zoo has any of the large fruit bats there you may be able to see for yourself the structure of their wings. These animals are sometimes called flying foxes.

On the back cover there is a high-speed photograph showing a song thrush in flight. The wings of a bird are, of course, its front limbs. The surface area is made up of feathers attached to these limbs. Try to collect some more photographs of birds in flight.



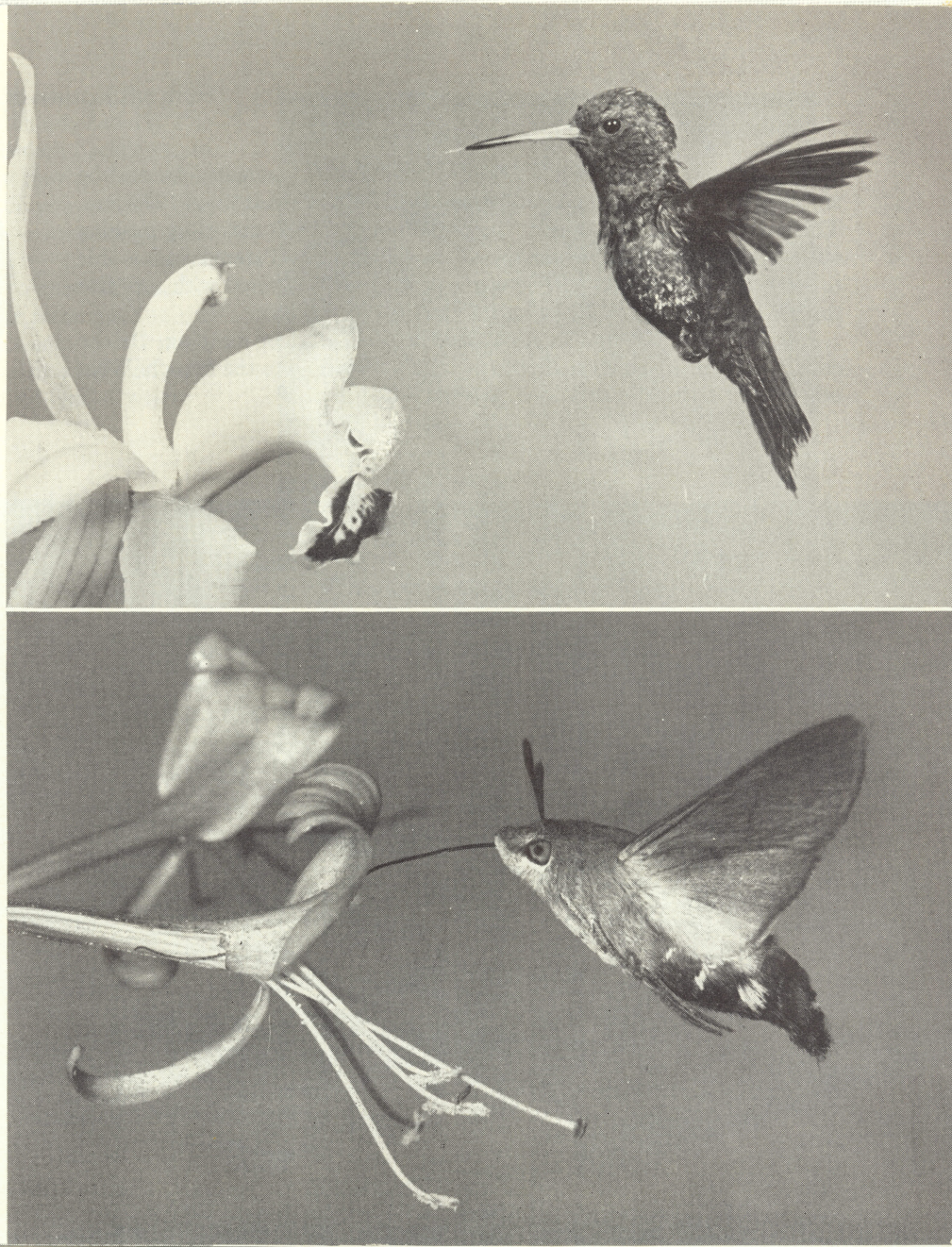
Mammals and birds, together with fishes, amphibians and reptiles, make up one great division of the animal kingdom – animals with backbones. All these animals have an inside skeleton. They also have four limbs. (In the fishes these are represented by the paired fins.)

Among the many groups of animals without backbones perhaps the most successful group is the insects. The body of an insect is protected by a tough outside covering; it always has six legs and often two pairs of wings as well. Flies have only one pair of wings, but there are two small stumps called halteres in place of the second pair which are used in balancing.

In spite of the many differences between an insect and a bird there are occasionally surprising likenesses. The photographs on the right show a humming bird and a humming bird hawk-moth. Humming birds are among the smallest of all birds – the body of one kind weighs only about as much as a sixpenny piece. Humming birds can move their wings very rapidly. The one in the picture is hovering in front of a flower into which it dips its long tongue to get the nectar. The humming bird hawk-moth is also able to hover in the air, and it uses its long proboscis for gathering nectar. Part of the honeysuckle flower in the picture has been cut away to show this more clearly.

Do you know of any other insects which are able to hover? Watch particularly the insects along a hedgerow or in a garden during the Spring and Summer months. Notice also how insects take off and how they land. Compare the slow wing beats of butterflies with the very rapid ones of bees and wasps and mosquitoes.

Watch birds in flight, too, and compare the ways in which different birds take off and land.

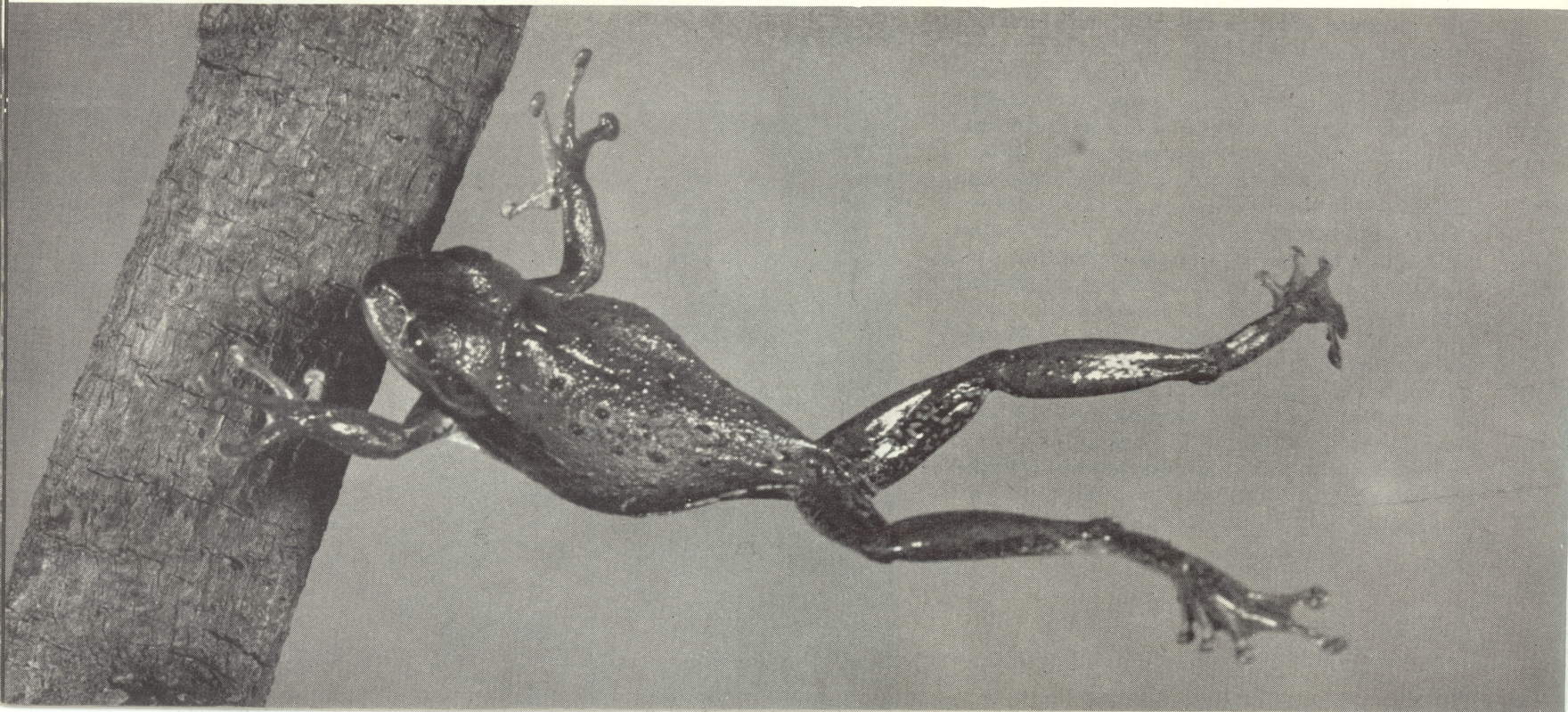
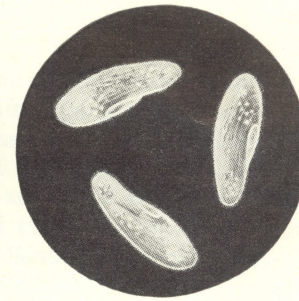


MORE WAYS OF GETTING ABOUT

The pictures on the right show two microscopic animals - an amœba and three small slipper microbes (paramœcium) - magnified about 100 times. The amœba lives in the mud at the bottom of ponds. It moves by pushing out part of the body into which the rest of it then flows. Paramœcium is able to swim through the water. The whole of its body is covered with very fine threads called cilia which can wave to and fro in the water.

The photograph below shows a tree frog in the act of jumping. On the ends of its toes are small suckers which help it to cling to the branch. What other animals also use suckers in moving about?

16 March (20 March)



The snake in the photograph below is the smooth snake – the rarest of the three kinds of snake found wild in Great Britain. (Do you know the other two?) The snake is a reptile and you might expect it, like other animals with backbones, to possess four limbs, but these have been so much reduced that they are not visible from outside although they can be seen as small bones if you examine the animal's skeleton. The smooth snake travels in a series of waves over the ground. Most snakes are also able to swim in water.

The photograph on the right shows a snail climbing up a sheet of glass. It was taken through the glass, and you can see the ripple-like movement on the under-surface of the snail's single 'foot'. If you can collect some pond snails watch how they walk up the smooth glass side of a jam jar or aquarium, and then turn upside down and walk on the 'ceiling' – the surface film of water.



Collect some more pond creatures and study their methods of movement. A dragon-fly larva uses jet propulsion – like the octopus. If your school has a microscope you may be able to watch some microscopic creatures swimming around in a drop of pond water.

HOW TO BE YOUR OWN DETECTIVE

These two series of programmes on some of our British wild mammals and on the ways animals move will have helped to show you some of the exciting things to be learned if you keep your eyes and ears open on your walks. A trip into the countryside will always be more interesting if you already have some idea of what you may find.

A pine-cone nibbled into the shape of an apple-core will tell you that there are squirrels about. There are many kinds of burrow used by foxes, badgers, rabbits, rats, or voles, each of which has something special to tell you about the animal that made it. If you look carefully at sandy or muddy tracks you can often find the traces of foot-marks; many animals also leave tufts of hair behind on thorns and wires. In this sort of observation you can be a real detective. It is always worth looking inside hollow trees and barns for any bats that may be hanging up asleep. Hedgehogs can often be found in hedge-bottoms and clumps of dry leaves; in fact there are many signs which you can look for to tell you of the presence of wild mammals. They aren't, of course, as easy to spot as birds, and it needs a lot of patient waiting to see most of them going about their affairs.

When you manage to see any wild creatures make a special note of what they look like, what they feed on, and how they move. Watch for the ways in which they use their arms and legs, see how many legs they have and if they help them in running, jumping, crawling and so on. Find out what creatures are specially adapted for swimming or flying.

Books can be very useful and you will find a list of some good ones in the right hand column. Don't be afraid to get help from them and also, and this is important, from your local library or museum. If you have a friend with some experience already get him to go out with you; if you know others who are also interested try and form a special group. There is still a great deal we don't know about the wild animals of Britain - who knows, one of these days, you may make a really interesting discovery!

BOOK LIST

- Barlee, John *Birds on the Wing* (Collins, 1947, 12s 6d)
Matthews, L. Harrison *British Mammals* (New Naturalist Series) (Collins, 1952, 25s)
Neal, Ernest *The Badger* (Penguin Books, 1958, 3s 6d)
Pitt, Frances *Wild Animals in Britain* (Batsford, 2nd ed. 1944, 8s 6d)
Shorten, Monica *Squirrels* (New Naturalist Series) (Collins, 1954, 15s)
Soper, Eileen A. *When Badgers Wake* (Routledge, 1955, 20s)
Stokoe, W.J. *The Observer's Book of British Wild Animals* (Warne, 1938, 5s)
Thompson, Harry V. and Alastair N. Worden *The Rabbit* (New Naturalist Series) (Collins, 1956, 16s)
Vesey-Fitzgerald, Brian *British Bats* (Field Study Books) (Methuen, 1949, 6s)

Book prices cannot be guaranteed

Acknowledgement is due to the following for permission to reproduce illustrations
SDEUARD BISSEROT long-eared bat, Leisler's bat, Natterer's bat, serotine bat, page 12, greater horseshoe bats, pages 13 and 23; ERIC HOSKING otters (both A. R. Thompson), page 5, red squirrel (Dr. M. S. Wood), page 8, song thrush, back cover (colour); FRANK W. LANE adult badger (Arthur Brook), page 7, grey squirrel (Maslowski & Goodpaster), page 9, running hare (Arthur Christiansen), page 14, sloth (Robert C. Hermes), koala bear (Garth Grant-Thompson), page 15, flying squirrels (Leonard Lee Rue III), page 18, humming-bird hawk moth (Ampleforth College Natural History Society), page 19, tree frog (Robert C. Hermes), page 20, snail (John J. Ward), page 21; JOHN MARKHAM dormouse, front cover (colour), woodmouse, page 2, hedgehog, rabbit, page 4, centipede, page 14, humming bird, page 19, smooth snake, page 21; ERNEST G. NEAL badger cubs and badgers' hair, page 6; NEWTON PHOTOGRAPHIC SERVICES amoeba, slipper microbes, page 20; BARRIE THOMAS cow seal and calf, page 10, grey seal calf, page 11; DOUGLAS P. WILSON dogfish, thornback ray, page 16, octopus, scallops, page 17.

WILLIAM HEINEMANN LTD squirrels from *Mr Collins and Tony go fishing* by Christine Dudley and F. R. Elwell, page 3.

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BBC TELEVISION FOR SCHOOLS



How Animals Move

SPRING TERM 1959

Mammals in Britain and How Animals Move

MONDAY: 2.05-2.30 P.M. AGE: 11-12
Telerecorded repeats on Friday 11.20 - 11.45 a.m.

NOTES FOR THE TEACHER

UNIT I. MAMMALS IN BRITAIN

The five programmes in Unit I have been devised as a broad introduction to the study of British mammals. The series will show the position of mammals in the natural order and review many of the British mammals; it will also explain how certain groups or species have become specially adapted to different ways of living and to the demands of their environments. Examples will be given of mammals which live part of their lives underground and of others whose habits are primarily arboreal, aerial, or aquatic. Unlike birds, wild mammals are not an immediately obvious feature of the British landscape, and their study has been much neglected. It is hoped that this series will not only stimulate a new interest but will also suggest a number of activities and simple observations that children can undertake singly or in groups.

12 January (16 January) INTRODUCING MAMMALS

This programme is a general introduction to the natural history of mammals and to their position among the other vertebrates. The chief diagnostic characters of mammals - warm bloodedness, the possession of some hair, and the suckling of young - will be indicated. The mammalian fauna of Britain is small and contains, apart from man, only seven of the sixteen orders; these are the Insectivores, the Chiroptera (bats), the Rodents, the Lagomorphs (hares and rabbits), the Carnivores, the Ungulates (hoofed animals), and the Cetaceans (porpoises, dolphins, and whales). Examples of all these orders will be shown in the programme and their chief and important differences illustrated. There will also be references to a number of separate species. There are about fifty kinds of land mammal that can be found wild in Britain; the whales and the rarer seals bring the total to about eighty. Each of them has its own special ecological niche.

19 January (23 January) BADGERS

The badger is not only one of the largest of the wild mammals of Britain but it is also one of the shyest. It is a very ancient inhabitant of Britain for its remains have been found in Middle Pleistocene deposits whose age can be little less than a quarter of a million years. Today the badger is well distributed in Britain and is, in many parts, quite common, but its shy and retiring habits mean that it is often overlooked. The badger is a carnivore, but its teeth are modified to meet its practically omnivorous feeding habits. Its home, or sett, is excavated underground and

UNIT II. HOW ANIMALS MOVE

here the cubs are born in early spring. These setts are dug out in many different kinds of soil, usually in wooded but sometimes in open country. Since it is primarily nocturnal in habit the animal relies to a great extent on its senses of smell and hearing, and these are well developed. There are many clues to the presence of badgers besides those of the sett tunnels – hairs on fences, pad-marks, scratched tree-stumps, and excavated moss-banks. The programme will show wild badgers at home, but also some techniques for badger watching and study which children may be able to carry out for themselves.

26 January (30 January) SQUIRRELS

One of the families of the great order of Rodents is represented in Britain by the squirrels, of which two species are to be found here. One species only – the red squirrel – is a native, and its range spreads throughout England and Wales. It has been reintroduced into Scotland and its distribution generally varies from place to place. The red squirrel is thickly furred and has a characteristically long and bushy tail as well as ear-tufts. It is arboreal in its habits and shows great agility in leaping from branch to branch. The programme will show preferences in habitat and food, the clues to its presence, the building of its nest or drey, as well as aspects of its life cycle. In addition to the red squirrel the introduced American grey squirrel is now an established member of our fauna. It is more omnivorous than the red, more destructive, and apparently hardier and more resilient, for it has not only kept up its numbers in the face of widespread control measures, but in some places has increased. Although the grey spends more time on the ground than the red, both are particularly well adapted for climbing.

2 February (6 February) SEALS

Seals are a very specially adapted group of carnivores which are more at home in the water than on the land. The body is streamlined allowing easy passage through the water and the hind limbs are permanently turned backwards to form a powerful propeller. The fore-flipper (which is really the hand alone) is short and fin-like, and the progression on land is slow and awkward; in the water, on the other hand, the movements are graceful and powerful. This programme will deal only with grey seals which come ashore for a few weeks in the year in the breeding season. They breed in coves and caves beneath high cliffs and on the beaches and rocks of the mainland and islands on the western coasts of Britain and on the Farne Islands of Northumberland. The life-cycle of the grey seal will be illustrated by film from breeding stations and islands off the coasts of Wales and Western Scotland. Reference will also be made to the technique of seal marking.

9 February (13 February) BATS

Bats form one of the biggest orders of mammals with their headquarters in the tropics and sub-tropics. The thirteen British species belong to the insect-eating group as distinct from the tropical fruit-eaters or flying foxes. Of these thirteen kinds only three are widely distributed in Britain – the pipistrelle, the long-eared, and Daubenton's bat. Bats are the only mammals that have achieved true flight and this programme will examine in some detail the modifications of the bat's body that have made this possible. Bats will be shown in flight and progression on a flat surface will also be illustrated. Most bats are gregarious and this is particularly true of the pipistrelle and horseshoe bats. The programme will also cover the remarkable ultrasonic methods of echo-location by bats, their hibernation, methods of marking them to discover their homing and flying abilities, and the taming of bats in captivity.

(Half-term repeats *16 February, 20 February*)

The first unit of programmes showed the ways of life of mammals in Britain whose habitats included the ground and under the ground, tree-tops, the air, and water. In this unit the emphasis will be on the environments and the methods of locomotion adopted by various groups of animals in these very different surroundings. Examples will be given from many other groups besides mammals, and teachers might like to relate the species shown to the overall pattern of animal life – the invertebrates on the one hand (for example, microscopic protozoa, jellyfish, thread-worms, marine worms, crustaceans, insects, millipedes and centipedes, molluscs) and the vertebrates on the other (fishes, amphibians, reptiles, birds, mammals).

23 February (27 February) ARMS AND LEGS

The two pairs of limbs possessed by mammals, birds, reptiles, and amphibians correspond with the two pairs of limbs in the most primitive group of vertebrates, the fishes. This programme will deal with various ways in which vertebrate limbs are used in locomotion, but examples of leg movements of some invertebrates will also be shown. After the programme the children might like to compare their own arm and leg movements with those of some of the creatures shown.

2 March (6 March) MOVING IN WATER

Three main methods of propulsion through water will be illustrated in this programme. The first is the horizontal or vertical wave-like motion of a water animal's whole body, which produces a backward force on the water and so pushes the animal forward. The second is the use of the limbs (for example, a penguin's flippers) as oars. In the third method a different principle, jet propulsion, is used. These three methods may all be seen quite well in animals easy to keep in a school aquarium – small fish, water boatmen, and the larvae of dragonflies.

9 March (13 March) MOVING THROUGH THE AIR

Only three groups of animal have true organs of flight – the birds, one small group of mammals, the bats, and insects. Before this programme teachers might like to revise some of the materials in the BATS programme shown during the first half of the term, but today's programme will deal mainly with bird flight – taking off, gliding, flapping, hovering, and landing. Many of these activities will be illustrated by specially shot film of one particular species of gull, the herring gull, which can be seen in most places in Great Britain during some part of the year. It is hoped most children may be encouraged to observe and record similar examples of bird movements in other common species, such as starlings, blackbirds, pigeons, and some of the smaller birds easy to observe in both town and country.

16 March (20 March) MORE WAYS OF GETTING ABOUT

Many animals use suction in order to adhere to various surfaces. A fly can walk on the ceiling because of the suckers on its feet. A starfish has tube-feet on the undersurface of its limbs which enable it to crawl over rocks or up the glass side of an aquarium. The undersurface of a snail's single 'foot' serves the same purpose, and water snails can even walk upside down on the surface film of water. It would be useful if this principle of suction could be demonstrated before the programme with a rubber sucker such as that used on toy darts. The programme will also illustrate various other forms of locomotion including those of some protozoa. If the school has a microscope many other examples of locomotion of microscopic pond creatures may also be studied.

BOOKS FOR REFERENCE

(Prices cannot be guaranteed)

- Barlee, J. *Birds on the wing* (Collins, 1947, 12s 6d)
Darling, F. F. *A naturalist on Rona* (O.U.P., 1939, 18s)
Darling, F. F. *Natural history of the Highlands and Islands* (The new naturalist series) (Collins, 1947, 16s)
Matthews, L. H. *British mammals* (The new naturalist series) (Collins, 1952, 25s)
Neal, E. *The badger* (Penguin Books, 1958, 3s 6d)
Pitt, F. *Wild animals in Britain* (Batsford, 1938, 8s 6d)
Shorten, M. *Squirrels* (The new naturalist series) (Collins, 1954, 15s)
Soper, E. A. *When badgers wake* (Routledge and Kegan Paul, 1955, 20s)
Wills, P. *On being a bird* (Parrish, 1954, 15s 6d)
Yonge, C. M. *The seashore* (The new naturalist series) (Collins, 1949, 25s)

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