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Descriptors-Audio Equipment, Audiovisual Aids, Audiovisual Communication, Audiovisual Instruction, *Aural Learning, *Effective Teaching, Film Production, Film Study, *Instructional Films, Learning, Recall (Psychological), Repetitive Film Showings, Retention, Teaching, *Visual Learning

This paper furnishes preliminary reports on four film research projects to determine: the relationship of length and fact frequency to the effectiveness of instructional motion pictures, the contributions of film introductions and film summaries to learning from instructional films, the effects o f repetitive film presentations on learning, and the relative contributions to learning of video and audio elements in films. About 6300 people were used for the testing of experimental film versions between July and November, 1949, and the data collected was processed by IBM machines. Two-thirds of this paper describes in detail the procedures of the tests. Tentative conclusions are stated at the end of the report on each test, and the paper includes a bibliography of reports. (CO)

PROGRESS REPORT NO. 13

INSTRUCTIONAL FILM RESEARCH PROGRAM

PERIOD: 1 July to 30 November 1949

The Pennsylvania State College
School of Education

Project Designation NR-781-005
Contract N6onr-269, T. O. VII
SDC Human Engineering Project 20-E- 4

Jointly Sponsored by Department of the Army and
Department of the Navy

FOREWORD

This report covers the period 1 July to 30 November, 1949. Its purpose is to record developments during this time, to inform sponsors and responsible agencies of these developments, and to give the growing audience of people interested in the Instructional Film Research Program advanced information of research results not covered by earlier or, as yet, by final reports.

The Scientific Officer of this Program as well as the Local Representative of the Office of Naval Research have approved the form of progress-reporting developed by the Instructional Film Research Program. This type of progress report has been adopted because of the widespread interest in the Instructional Film Research Program by people not directly responsible for its administration. Also, this form of reporting was approved because of the need to give summaries of results before final technical reports could be prepared and distributed. This approval is an example of the commendable liberality with which the representatives of the Office of Naval Research are administering and supervising Contract N6onr-269, Task Order VII.

Financial statements will not be given in this report. Fiscal analyses will be supplied to those responsible for this Research Program by means of a supplementary letter. It is believed that most of the people who read progress reports of Instructional Film Research Program are not interested in budgets.

The increased demands for these progress reports have influenced the form in which they are written. It is intended that they shall be both informative and useful.

C. R. CARPENTER, Director
Instructional Film Research Program
The Pennsylvania State College

CONTENTS

NUMBER, TITLE, STATUS, AND PROGRESS OF RESEARCH PROJECTS

Project No.	Title	% Completed*	% Increase Since 1 July 1949
1	Exploratory Study of Educational Films	cancelled	
2	Film Analyzer Equipment	completed	
3	Group Instruction and Test System (The Classroom Communicator)	99	0
4	Critical Evaluation and Summary of Experimental Literature on Instructional Films	100	5
5	Critical Evaluation and Summary of Learning Theories in Psychology and Education Pertinent to Instructional Motion Pictures	Completed & Reported	
6	Relative Effectiveness of Color and Black-and-White in Instructional Films	completed	
7	Musical Backgrounds in Instructional Films	100	5
8	Annotated Bibliography on Effectiveness of Music in Instructional Films	Completed & Reported	
9	The Relative Effectiveness of Massed Versus Spaced Film Presentation	Completed & Reported	
10	Effects on Training of Experimental Film Variables, Study I: Verbalization, Rate of Development, Nomenclature, Errors, "How-It-Works," Repetition	completed	
11	Design of a General Model for Testing Instructional Motion Pictures.	cancelled	
12	Relationship of Length and Fact Frequency to Effectiveness of Instructional Motion Pictures	90	15

* Percentage completed exclusive of the final report

13	Effects of Inserted Questions and Statements on Film Learning	completed	
14	Effects of Learner Representation in Film-Mediated Perceptual-Motor Learning	Completed & Reported	
15	Relative Effectiveness of Instruction by: Films Exclusively, Films plus Study Guides, and Standard Lecture Methods	completed	
16	Filmic Illustrations of Research Findings of the Instructional Film Research Program	40	10
17	Contributions of Film Introductions and Summaries to Learning from Instructional Films	completed	
18	Research Literature on Film Commentaries	completed	
19	Commentary Variations: Level of Verbalization, Personal Reference, and Phase Relations in Instructional Films on Perceptual-Motor Tasks	Completed & Reported	
20	Effectiveness of Three-Dimensional Instructional Sound Motion Pictures for Perceptual-Motor Skills	50	0
21	Characteristics of Subjects in Relation to Film Learning Gains	65	0
22	Attention-Gaining Devices in Films	80	30
23	Physiological Indicators of Subjects' Involvements during Learning	completed	

24	Effects of Repetitive Film Presentations on Learning	100	10
25	Investigation of the Effects of Prestige Factors on Learning and Attitude Restructuring from Sound Films	80	30
26	Development of Procedures for Pre-Production and Pre-Release Testing of Instructional Films	30	5
27	Development of Procedures for Constructing Temporal Profiles of Learning from Instructional Films	35	5
28	Comparisons of Learning from "Dramatic" and "Factual" Films	25	0
29	Relative Effect on Learning of showing Right or Right-Wrong Methods in Film Presentations of Conceptual Learning and Perceptual-Motor Tasks	10	0
30	Practice Effects in Film Learning	65	15
31	A Report on Instructional Film Research, Production, and Utilization in Great Britain, Canada, and Australia	Completed & Reported	
32	Relative Contributions to Learning of Video and Audio Elements in Films	80	20
33	Employment of Sound Films for Restructuring Attitudes	45	10
34	Experiments on Functional Characteristics of the Classroom Communicator	20	10
35	The Effects of Authentic Sounds in Instructional Films	60	10
36	Effects on Learning of "Shock Sequences" in Sound Films	5	0

37	A Theoretical System, and Other Requirements, for Research in "Mass Media" (Sound Films, Radio and Television)	25	5
38	Procedural Requirements for Audience-Controlled Film Flexibility for Rapid and Complete Learning at Multiple Levels	5	0
39	Development of a Printing Device for The Classroom Communicator	40	10
40	Development and Evaluation of a Flexible Device for Individual Film Study	10	5
41	Development of a Flexible Multiple-Channel Magnetic Film Recording and Reproducing System for Research and Instruction	15	10
42	Development of Experimental Equipment, and Evaluation of Monaural and Binaural Sound Integrated with Pictorial Fields in Instructional Films	10	5
43	Development and Testing Procedures for Infra-Red Photographic Recording of Audience Reactions.	10	0
44	Effects on Training of Experimental Film Variables, Study II: "How-It-Works," Verbalization, Participation, Succinct Treatment	70	10
45	Summary Report on Instructional Film Research, Production, and Utilization in the United States	35	5

GENERAL STATEMENT

The main efforts of the Staff of the Instructional Film Research Program for this report period have been directed toward the testing of experimental films with selected populations, the production of additional series of experimental films, the processing of data, and the preparation and issuance of final technical reports.

Testing. The actual testing or proving of films with large and appropriately selected populations has been more extensive than for any previous report period.

Following preliminary tests on 434 high school students, the experimental films for Project Number 12 (Vincent), Relationship of Length and Fact Frequency to Effectiveness of Instructional Motion Pictures, were tested on a polulation of 503 Air Force recruits at the Lackland Air Base, San Antonio, Texas. Responsible branches and sections of the Air Force were most cooperative and provided very favorable and realistic conditions for testing the experimental versions of films dealing with Aerology. A more advanced test population was also needed, and the films were therefore shown to 324 College students who were beginning their first course in Meterology. Thus, a total of 1261 subjects have been employed for testing the hypotheses and experimental film versions of Project Number 12. Additional replications are planned.

Project Number 22 (Neu), Attention-Gaining Devices in Films, was tested at the Great Lakes Naval Training Station with 1150 Navy recruits. With the cooperation of the Army Signal Corps and other Army commands, further tests were run on 1500 trainees at Fort Dix. Thus, for this Project the film variables and versions were tested on both Navy and Army recruits until the population of 2650 as required by the experimental design was reached.

The experimental films for Project Number 44 (Jaspen), Effects on Training of Experimental Film Variables, Study II: "How-It-Works," Verbalization, Participation and Succinct Treatment, were tested at the Great Lakes Naval Training Station on approximately 2000 recruits.

Selected films for Project Number 32 (Nelson), Relative Contributions to Learning of Video and Audio Elements in Films, were tested on 430 members of the local Penn State ROTC.

In summary approximately 6300 subjects were used during July, August, September, October and November for the testing of experimental film versions.

The preparation of tests for both experimental and selected films is always a difficult and time-consuming task. The tests for Project Number 22 on Attention-Gaining Devices

in Films are especially interesting in that a fair proportion of the multiple-choice test items were presented to the subjects in visual form, i.e. as drawings and outlined sketches.

Production. Production of experimental films has been accomplished on schedule. The Motion Picture and Recording Studios have cooperated fully with members of the Film Program's Research Staff, and high production standards have been maintained.

In addition to completing the required film productions for Projects 22 and 44 during July and August, production was begun and is well advanced on Project Number 33 (Abramson), Employment of Sound Films for Restructuring Attitudes, and Project Number 35 (Tyo) The Effects of Authentic Sounds in Instructional Films: I. Learning The Stroke in Typewriting.

For two projects, Number 32 (Nelson) (see reference above,) and Number 25 (Kishler), The Effects of Prestige Factors on Learning and Attitude Restructuring from Sound Films, existing films were selected and are being used. For Project Number 32, "Theory of Flight" and "Problems of Flight" from Encyclopaedia Britannica Films were used, while "Keys of the Kingdom" was selected for testing in Project Number 25.

Processing of Data. The statistical processing of the data which results from the extensive testing of large populations continues to require a major part of the time of several members of the Research Staff. For scoring tests, a test-scoring machine is used on a full-time basis. Tabulating and calculating services provided by the Central IBM Service Bureau of the College have not, as yet, proven to be entirely satisfactory. A major part of IBM machine calculating is still being done at the U. S. Naval Supply Depot, Mechanicsburg, Pennsylvania, where complete cooperation has been given in the form of making IBM tabulators and sorters available for use by qualified Instructional Film Research Program Staff members.

Reports. During the report period under review Progress Report No. 11-12 was printed and distributed. This report is generally considered to be a major contribution to the field of communications research. In it Drs. van Ormer and Smith reviewed the work of the Film Research Program within a carefully organized framework of modern learning theory. Dr. Ash completed his final technical report on Project 9, The Relative Effectiveness of Massed Versus Spaced Film Presentation. During this period, also, Dr. Roshal's report on Project 14, The Effects of Learner Representation in Film Mediated Perceptual-Motor Learning, and Mr. Zuckerman's report on Project 19, Commentary Variations: Level of Verbalization, Personal Reference, and Phase Relations in Instructional Films on Perceptual-Motor Tasks, were carried through the final stages of manuscript preparation and editorial work.

Drs. Hoban and van Ormer did the major part of the work on the preparation of a report (which will be available

soon) on Project Number 4, A Critical Evaluation and Summary of Experimental Literature on Instructional Films.

A bibliography of all reports is given at the end of this Progress Report.

ORGANIZATION

Several changes of importance were made in the organization of the Instructional Film Research Program. The Advisory Committee recommended that a Director for the Program be officially appointed. This was done by the Office of the President of the College. It was decided to reduce the size of the Advisory Committee and to define its function as being strictly advisory to the Dean of the School responsible for the Instructional Film Research Program. It was deemed desirable to eliminate from the table of organization the names of consultants since they had already served their functions during the initial stages of the Program and since other developments such as the formation of a Joint Services Advisory Committee has made their services less necessary than formerly.

An Administrative Committee consisting of seven senior members of the Staff of the Instructional Film Research Program was appointed to assist the Director in the administration of the Program.

It was found necessary to reduce the amount of part-time and extra-time services of regular faculty members until more funds were made available for the Program. Limitations of funds, also, precluded the appointment of additional Graduate Research Fellows (Navy). It was decided to build up as far as possible a core of experienced staff members and to this end two previous Research Fellows, Dr. Philip Ash and Dr. Nathan Jaspen were employed as Staff members. Furthermore, arrangements were made to retain Mr. Leslie P. Greenhill for a further year.

The problem of adequately staffing the Instructional Film Research Program remains acute. Individuals who have the required abilities, training and interest, and who will accept salaries within the scale established by the College are difficult to find. It seems to be necessary that junior members of Staff or advanced graduate students should be trained on the Program and retained for advanced professional research. Indeed, the training function of the Program may be one of its most important contributions to the field of research and instruction involving the media of mass communication.

TABLE OF ORGANIZATION

INSTRUCTIONAL FILM RESEARCH PROGRAM

1 July to 30 November, 1949

Advisory Committee

Dean M.R. Trabue, School of Education (Chairman)

Dr. C.R. Carpenter, Director of Program (Secretary)

Dr. R. Adams Dutcher, Chairman, Research Council

Dean Ben Euwema, School of Liberal Arts

Dean George L. Haller, School of Chemistry and Physics

Dr. George F. Johnson, Professor of Agriculture Extension

Mr. E. L. Keller, Executive Assistant, Central Extension

Dr. Bruce V. Moore, Head, Department of Psychology

Dr. Eric A. Walker, Director, Navy Ordnance Laboratory

Dr. P. C. Weaver, Acting Head, Department of Education

Research Staff

Dr. C.R. Carpenter, Professor of Psychology, Director

Mr. Leslie P. Greenhill, Research Associate, Program Coordinator

Dr. Philip Ash, Associate Professor of Film Research

Dr. Nathan Jaspen, Associate Professor of Film Research

Mr. F. T. John, Director, Engineering Section

Mr. John B. Cannon, Program Engineer

Dr. Hugh M. Davison, Professor of Educational Research

Dr. Harold E. Nelson, Assistant Professor of Speech

Dr. Albert K. Kurtz, Professor of Psychology

Dr. Kendon R. Smith, Associate Professor of Psychology

Dr. Kinsley R. Smith, Professor of Psychology

Dr. Charles Hoban, Associate Professor of Education, The Catholic University of America

Dr. E. B. van Ormer, Professor of Psychology

Dr. A. W. VanderMeer, Associate Professor of Education

Mr. Edward Abramson, Assistant Professor of Sociology

Dr. James Gemmell, Associate Professor of Economics and Business Education

Mr. John Tyo, Research Assistant

Mr. Chester L. McTavish, Doctoral Candidate

Mrs. Marjorie Straube Mertons, Doctoral Candidate

Motion Picture and Recording Studio Staff

Mr. Frank S. Neusbaum, Administrative Head, Motion Picture Production

Mr. Delmer P. Duvall, Assistant Specialist, Motion Picture Production

Mr. Henry Miller, Associate Specialist, Motion Picture Production

Mr. Paul H. Seitzinger, Assistant Specialist Motion Picture Production

Mrs. Marjorie Bloomfield, Secretary

Graduate Research Fellows (Navy)

Mr. John P. Kishler (Psychology)

Mr. D. Morgan Neu (Psychology)

Mr. Dean S. Northrop (Education)

Mr. Loran S. Twyford (Psychology)

Graduate Research Assistants (Navy)

Mr. Edward P. McCoy (English)

Miss Mary C. Welch (Education)

Clerical Staff

Mrs. Betty B. Forry, Project Secretary

Miss Bernice R. Rider, Stenographer

Mrs. Shirley Blau, I.B.M. Test-Scoring Machine Operator

Mrs. Berry Mohnkern, Statistical Clerk

Mrs. Gloria B. Kahn, Statistical Clerk

Mr. William Gray, Clerk, Property and Procedures

Instructional Film Research Program Administrative Committee

Dr. C. R. Carpenter, Chairman

Mr. L. P. Greenhill, Secretary

Dr. Philip Ash

Dr. Nathan Jaspen

Mr. F. T. John

Dr. Kendon R. Smith

Dr. A. W. VanderMeer

Joint Military Services Advisory Committee

Mr. Joseph Gaberman, Scientific Officer, Special Devices Center, O.N.R., Chairman

Mr. Fred E. Kelly, Signal Corps Photographic Center, Secretary

Dr. C. R. Carpenter, Director, Instructional Film Research Program

Dr. A. A. Lumsdaine, Human Resources Research Laboratories Air Force

Mr. Paul Murdock, Army Pictoral Service

Mr. L. J. Tate, Bureau of Personnel, Navy

Dr. William Timmons, Navy Photographic Center

LIAISON ACTIVITIES

The most important development relative to liaison activities was the organization of a Joint Military Services Advisory Committee. The formation of this committee was made both desirable and necessary for the following reasons: 1. The support of the Program by the Department of the Army cooperatively with sponsorship by the Department of the Navy, through the Special Devices Center, made it necessary to have official channels through which the broadened interests of the Military Services could be represented to the Instructional Film Research Program. 2. It was necessary that the immediate practical problems of the Military Services be presented to the Instructional Film Research Program Research Staff for their implications and use in film investigations. 3. It was also desirable that the results of experimentation on instructional and informational films be presented informally and discussed with representatives of the Military Services who could in turn apply these results to film production and utilization. 4. It was necessary from time to time to arrange for practical cooperation between the Instructional Film Research Program and various branches of the Military Services on production and testing jobs. 5. It was desirable to have the assistance of representatives of sponsoring services both in general research program planning and individual research project planning. It is expected that the Joint Military Services Advisory Committee, which in the future will meet quarterly, will serve these and other valuable functions.

Those persons who are responsible for administering the Instructional Film Research Program have accepted the responsibility for making the results of experimentation known to those who may wish to use them. It is believed that scientific investigators have an obligation to communicate the results of their work to those who may apply them, and in turn benefit those who support the research. To this end the Instructional Film Research Program reports are being written in several forms for different audiences. Every assistance possible is given Special Devices Center in distributing the reports widely and effectively. Furthermore, within the limits of time available, members of the Film Research Staff meet with professional groups to present and interpret the experimental results. Lectures and demonstrations have been given, for example, to the Washington Film Council, to the New York Film Council, to the Calvin Company Workshop , and to the University Film Producers Association. As a result of these efforts the work of the Instructional Film Research Program is becoming widely and favorably known throughout the United States and other countries. The reception of reports, lectures and demonstrations has been enthusiastic. Currently, a principal concern of the Instructional Film Research Program Staff is that it shall measure up to the high levels of expectancy held by the many friends of the Program.

OPERATIONAL PROBLEMS

The main operational problems for the period of report were: 1. The completion of final technical reports. Unanticipated complications in statistical analyses have delayed several reports, particularly those for which Dr. VanderMeer was the project leader. The report on research literature on which Dr. Hoban worked effectively during the summer and which Dr. vanOrmer was responsible for completing, has been overly long delayed. 2. Several projects not yet up to the final report stages, have not progressed according to reasonable expectations. Project Number 3, for which Mr. John is primarily responsible, and Project Number 33 under Mr. Abramson fall into this class. In general, the main problem here is that of completing, through the stage of final report writing, the research projects which have been undertaken.

A minor operational problem which gives the Research Staff some concern is that of answering the two following questions: 1. What proportion of time and effort should be spent actively assisting the military services to improve specific training and instructional sound film productions? 2. How can this best be done? Pilot procedures have been decided upon and are being put to test with selected films which are being produced by the Army Signal Corps.

Since last spring no new research projects have been undertaken because of the obvious wisdom of completing those already initiated. With the completion of a fair percentage of major projects, the time is rapidly approaching when work involving the restructuring of the actual research program, and the developing of additional research projects, will be in order.

A PRELIMINARY REPORT ON PROJECT NO. 12

RELATIONSHIP OF LENGTH AND FACT FREQUENCY TO EFFECTIVENESS OF INSTRUCTIONAL MOTION PICTURES

W. S. Vincent*, P. Ash and L. P. Greenhill

STATEMENT OF THE PROBLEM

The purpose of this research is to determine the effect on learning of varying (1) the total amount of information presented in a film of a given length, and (2) the length of time allotted to conveying a fixed amount of information. The experimental question posed is: Does increasing the fact density of a film result in a proportionate increase in the learning accomplished?

EXPERIMENTAL DESIGN AND PROCEDURES

The Films

Using as source material a series of films on aerology[1], visual material was selected for inclusion in four versions of an introductory film on the weather.

"The Weather" covered, in more or less detail depending upon the version, the basic facts with respect to the formation and characteristics of frontal weather, and the effect of weather conditions on flying.

A careful content analysis of a tentatively selected body of material was made to permit controlling within narrow limits the content of four versions of the film.

The unit of content employed was the individual

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* Dr. W. S. Vincent was the initial project leader. Extensive work on this research was done by the Film Research Staff

1 The source films were in color and in animation. They had been produced by the Walt Disney studio for use by the Department of the Navy. The films included:

Aerology - Fog (MN-119B),
Aerology - Air Masses and Fronts (MN-119D),
Aerology - The Cold Front (MN-119E),
Aerology - The Warm Front (MN-119F),
Aerology - The Occluded Front (MN-119b).

fact, and a fact was defined as any item about which a question could be asked. This was designated as the "questioning to exhaustion" technique of testing. To identify all the facts in each script, a committee of eight or nine IFRP Staff Members read preliminary drafts, and wrote questions for every item mentioned. The scripts were modified so that the number of facts in each version could be carefully specified. The scripts for the two films of each length included facts in the ratio of 1:2. However, the total number of words in each pair of equal length was kept constant by the use of repetitions, prefatory statements, and other filler material which did not add new facts. Illustrations and examples were considered as repetitions. This material was included in both the visuals and the commentary. One version, designated as Long Heavy, included all the facts used. This version ran 30 minutes. A second version, the Long Light, included half the facts used in the Long Heavy but also ran 30 minutes. A third version, the Short Heavy, included all the facts that were in the Long Light version, but ran 15 minutes. Finally, a fourth version, the Short Light, also running 15 minutes, included only half the facts found in either the Short Heavy or the Long Light version.

To ensure further that the commentaries of the four versions were of equal verbal difficulty, and that the level of verbal difficulty was appropriate for twelfth grade high school students or military trainees of equivalent education, an analysis of the reading level of the four scripts was made. The Dale-Chall formula[2] was used for this purpose, and minor changes were made in the commentaries to obtain equality of reading difficulty. The formula is based on two counts: average sentence length, and percentage of unfamiliar words.

Table I summarizes the characteristics of the scripts for the four versions. The four versions were in color animation and in sound.

The Tests

An objective-type test employing four-choice questions was constructed. The questions used were those formulated to identify the facts in the films. Since a test of 224 items was considered too long, a sample of 136 of the questions was selected. The distribution of question coverage for the versions is also given in Table I. The same test was used for all groups.

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2 Dale, E., Chall, J. S. Formula for predicting readability. Ed. Res. Bul., 1948, 27, 11-20, 37-54

TABLE I

CHARACTERISTICS OF THE EXPERIMENTAL VERSIONS OF "THE WEATHER"

	Version			
	Long Heavy	Long Light	Short Heavy	Short Light
Running Time	28.8 min.	29.1 min.	14.3 min.	14.3 min.
Total Number of Facts	224	112*	112*	56
Facts per minute	7.77	3.85	7.85	3.91
Total Number of Syllables	3599	3596	1745	1760
Syllables per minute	124.9	123.7	122.3	122.8
Verbal Difficulty of Script				
Dale-Chall Score	6.8071	6.8911	6.9652	6.7320
Grade Level	7-8	7-8	7-8	7-8
Number of Items in Test	136	89**	89**	45

* Same facts

** Same items

Experimental Procedures

The general procedure followed involved showing each of the four versions to one of four comparable groups, and testing these four groups and a comparable fifth Control Group which was not shown a film. The mean scores were compared for (1) the entire test, (2) for the items common to all but the Short Light version, (3) for items common to all versions, and (4) for items only in the Long Heavy version.

Three replications were conducted. The replications are summarized in Table 2.

The first replication employed twelfth grade students in the Lewistown, Williamsport, and Sunbury (Pennsylvania) high schools. In each school five groups were used. The high school students were tested for immediate recall and for four-weeks delayed recall.

The second replication employed ten flights of recruits (basic trainees) in the Air Force (Lackland Air Force Base, San Antonio, Texas). Each film version was shown to two flights, who were tested immediately and again seven weeks later.

The third replication employed students in five sections of a course in elementary meteorology at The Pennsylvania State College. These subjects were tested once only, one week after the film showings.

TABLE 2

SUMMARY OF THE EXPERIMENTAL REPLICATIONS

	Replication		
	High School	Air Force	College
Number of Subjects	434	513	324
Character	Male and female, 12th grade students, five groups in each of three high schools.	All male, ten intact companies of Air Force basic trainees (two companies to each treatment)	Male and female, in five intact sections of an introductory course in Meteorology
Date of Study (1949)	April-May	June-August	September-October
Treatment:			
Films	Yes (except for control group	Yes (except for control group)	Yes (except for control group)
Retention Test	Immediately after film	Immediately after film	One week after film
Delayed Recall Test	Four weeks after film*	Seven weeks after film	None

* Delayed recall test not readministered to Control Group.

The Populations

The distributions on available criteria for the three populations used in the study are given in Table 3.

For the high school students, only sex distribution data was obtained. In each high school, students were taken from their classes and distributed among the five treatment groups so as to ensure more or less comparability with respect to sex, course in which they were enrolled, and similar factors. The groups, as finally constituted did not differ significantly with respect to sex distribution (Chi-square not significant at the 30 per cent level).

For the Air Force basic trainees, only educational level was obtained. The methods of company formation employed in the Air Forces are such that one may be reasonably confident that each intact company (flight) is a random sample of the whole Air Force basic recruit population. Therefore, intact flights were used, without further randomization. The treatment groups (two flights each) did not depart significantly from homogeneity with respect to educational level (Chi-square not significant at the 10 per cent level).

For the College students, sex, semester, and curriculum data were available. Intact classes had to be used for the four film groups. The Control Group comprised a fifth class plus those students in the other four classes who were absent when the films were shown. It may be noted that the treatment groups, as here defined, departed significantly from homogeneity with respect to sex distribution and curriculum distribution (Chi-square significant at the 5 per cent level or better in both cases).

TABLE 3

DISTRIBUTION OF SUBJECTS BY SEX, SEMESTER, CURRICULUM AND/OR EDUCATION FOR THE COLLEGE, HIGH SCHOOL, AND AIR FORCES POPULATIONS

COLLEGE POPULATION

Group	Sex[1]		Semester[2]			Curriculum[3]			Total
	M	F	1-4	5-6	7-8	Sci.	Ag.	LA	
Long Heavy	27	6	5	11	17	13	8	12	33
Long Light	65	13	6	18	54	32	19	27	78
Short Heavy	38	8	9	12	25	11	12	23	46
Short Light	80	2	14	18	50	16	20	46	82
Control	73	12	17	21	47	15	22	48	85
TOTAL	283	41	51	80	193	87	81	156	324

HIGH SCHOOL POPULATION

Group	Sex[4]		
	M	F	
Long Heavy	40	40	80
Long Light	43	48	91
Short Heavy	34	49	83
Short Light	32	49	81
Control	50	49	99
TOTAL	199	235	434

AIR FORCE POPULATION

Group	Education[5]			
	Grade School	High School	College	
Long Heavy	15	92	0	107
Long Light	12	94	1	107
Short Heavy	9	93	5	107
Short Light	19	75	2	96
Control	13	71	2	86
TOTAL	68	425	10	503

1. Chi-square = 10.89, .05 > P > .02
2. Chi-square = 8.16, P > .30
3. Chi-square = 18.78, .05 > P > .02
4. Chi-square = 3.60, P > .30
5. Chi-square = 4.80, P > .10

RESULTS

The means for the film test scores for the groups seeing the four versions and for the Control Group are reported in Tables 4 (High school students), 5(Air Force basic trainees), and 6 (College meteorology students). For each of the five groups, means and related statistics are given for the following scores:

V_1 Score - based on 47 items covered by the Long Heavy version only. Mean scores for the groups seeing the other versions, where these mean scores were higher than the Control Group means, may be attributed to inferences.

V_3 Score - based on the 44 items common to the Long Heavy, Long Light, and Short Heavy versions. These items were not covered in the Short Light version.

V_4 Score - based on the 45 items common to all four versions. This score represents a measure of direct learning on all the tested material in the Short Light version.

T_2 Score - this is the sum of the V_3 and V_4 scores. It is based on the 89 items covered in the Long Light and Short Heavy versions.

Total Score - based on all the 136 items. This score covers all the information included in the Long Heavy version.

The tables of differences among the versions will not be included in this report, but they will be summarized briefly.

The following findings may be stated:

1. Significant forgetting took place. For both the high school sample (4-week interval) and the Air Force sample (7-week interval) the delayed recall test mean scores were about one standard deviation lower than the immediate recall means, and this difference was, in almost all cases, significant at the 0.1 percent level of confidence. The anomalous finding (Table 5) that significant "forgetting" took place in the Control Group in the Air Forces (this group did not see a film and, theoretically, learned nothing to forget) may be explained on the basis of very poor motivation on the recall test. This second administration of the long test presented the Control Group with an extremely frustrating task for the second time. On the second occasion, the group largely "gave up" and answered randomly.

2. Significant learning took place. For both the immediate recall test and the delayed recall test, for all three populations, almost every film group mean score is substantially (more than one standard deviation) and significant-

ly (at the 0.1 percent level of confidence) greater than the comparable Control Group score. The only exceptions were as follows: the V_1 and V_3 delayed recall means for the Short Light group in the high school sample were not significantly different from the high school V_1 and V_3 means for the Control Group; and the V_1 and V_3 means for the Short Light group in the College population were not significantly different from the College Control Group means for these scores. Since the V_1 and V_3 scores pertain to information not shown to the Short Light group, this finding is not surprising.

3. Some inferential learning took place. This is the converse of the finding reported above. Although not actually shown the items entering into the V_1 Score, the members of the Long Light and Short Heavy groups in all populations earned higher scores than the comparable Control Groups did, for both immediate and delayed recall tests. Furthermore, with the exceptions noted above, the Short Light group inferred significantly more V_1 and V_3 items than did the comparable Control Groups.

4. With regard to the inter-version comparisons, the following comments seem justifiable:

a. The "best" version, in an all-around sense, on the basis of the total score, differed from sample to sample. For the High School sample, the Short Heavy version seemed the most effective. For the Air Force and the College samples, the Long Light version seemed to be most effective.

b. In the Air Force and High School samples, the Long Heavy group scored significantly higher than any other on the V_1 score for the immediate recall test. At the end of the delayed recall interval, however, this difference approached zero, and was not significant in a statistical sense. In the College sample the Long Heavy group had a higher V_1 score than any other group at the end of one week, but only the difference from the Short Light group was statistically significant.

The V_1 score covered items included explicitly only in the Long Heavy version.

c. In general, the Short Light Group scored higher on the V_4 score (items common to all versions, and the only items in the Short Light version) than any other group. These differences were not large, however, and only a few were significant at the 5 percent level or better.

d. At the end of the delayed recall period, all differences among the versions were much smaller than they had been on the immediate retention test, and most of them were not significant.

TABLE 4

MEANS, STANDARD DEVIATIONS, AND STANDARD ERRORS OF MEANS FOR IMMEDIATE RECALL AND DELAYED RECALL SCORES, FOR HIGH SCHOOL POPULATION

Group	No. cases	Immediate Recall Mean	S.D.	SE_m	Delayed Recall Mean	S.D.	SE_m	Mean Diff.	r
Total Score									
L H	80	62.2	16.2	1.82	50.1	15.4	1.73	12.1***	.77
L L	91	63.0	17.3	1.82	52.9	15.8	1.67	10.1***	.81
S H	83	64.1	15.8	1.74	54.7	15.4	1.70	9.4***	.90
S L	81	58.1	15.0	1.68	47.2	14.2	1.59	10.9***	.80
C	99	42.1	7.9	.80					
T_2 Score									
L H	80	41.9	11.5	1.29	33.8	11.0	1.24	8.1***	.61
L L	91	45.6	13.4	1.41	36.9	11.9	1.26	8.7***	.76
S H	83	46.6	12.6	1.39	38.1	11.5	1.27	8.5***	.88
S L	81	41.2	11.3	1.27	32.4	10.5	1.17	8.8***	.79
C	99	28.1	5.7	.57					
V_1 Score									
L H	80	20.4	5.4	.61	16.3	5.6	.63	4.0***	.67
L L	91	17.5	5.0	.52	16.0	4.8	.50	1.4***	.71
S H	83	17.4	4.2	.46	16.6	4.5	.49	.8*	.56
S L	81	16.9	4.6	.51	14.8	4.6	.51	2.1***	.53
C	99	14.0	3.4	.35					
V_3 Score									
L H	80	20.5	6.4	.72	16.7	5.7	.64	3.8***	.71
L L	91	22.3	6.5	.69	17.9	5.3	.56	4.5***	.71
S H	83	23.5	6.8	.75	18.4	6.3	.70	5.1***	.81
S L	81	16.7	5.3	.59	14.4	5.0	.56	2.3***	.67
C	99	13.9	3.4	.34					
V_4 Score									
L H	80	21.4	5.9	.67	17.1	6.1	.69	4.3***	.65
L L	91	23.3	7.5	.79	19.0	7.3	.77	4.3***	.66
S H	83	23.1	6.5	.72	19.7	6.1	.67	3.4***	.79
S L	81	24.5	7.3	.82	18.0	6.6	.74	6.5***	.70
C	99	14.2	3.7	.37					

* Significant at the 5 percent level of confidence
** Significant at the 1 percent level of confidence
*** Significant at the 0.1 percent level of confidence

TABLE 5

MEANS, STANDARD DEVIATIONS, AND STANDARD ERRORS OF MEANS FOR IMMEDIATE RECALL AND DELAYED RECALL SCORES, FOR AIR FORCES POPULATION

Group	No. of cases	Immediate Recall Mean	S.D.	SE_m	Delayed Recall Mean	S.D.	SE_m	Mean Diff.	r
Total Score									
L H	107	54.7	13.1	1.27	42.7	10.7	1.04	12.0***	.63
L L	107	56.1	11.9	1.16	44.8	10.2	.99	11.3***	.61
S H	107	52.6	13.6	1.32	44.2	10.8	1.05	8.4***	.04
S L	96	50.6	13.0	1.33	42.4	9.0	.93	8.2***	.55
C	86	40.5	8.5	.92	35.8	6.4	.69	4.7***	.38
T_2 Score									
L H	107	37.5	9.0	.87	28.7	7.6	.73	8.8***	.58
L L	107	40.4	9.2	.90	30.8	7.6	.74	9.6***	.64
S H	107	37.9	10.7	1.04	30.3	7.8	.76	7.6***	.63
S L	96	35.5	9.6	.99	28.6	6.9	.71	6.9***	.46
C	86	27.2	6.5	.70	24.2	5.3	.57	3.0***	.30
V_1 Score									
L H	107	17.2	5.0	.48	14.0	4.2	.41	3.2***	.49
L L	107	15.7	4.2	.41	14.0	4.0	.39	1.7**	.36
S H	107	14.7	4.1	.40	13.9	4.1	.39	.8*	.45
S L	96	15.0	4.5	.46	13.8	3.5	.36	1.2**	.45
C	86	13.3	3.4	.36	11.6	2.7	.30	1.7***	.34
V_3 Score									
L H	107	18.9	4.7	.46	13.7	3.9	.38	5.2***	.45
L L	107	20.4	4.7	.46	14.7	4.2	.40	5.7***	.58
S H	107	19.4	5.7	.56	14.6	4.2	.41	4.8***	.65
S L	96	15.0	4.7	.48	13.6	3.3	.34	1.4***	.34
C	86	13.1	3.7	.41	11.9	3.4	.37	1.2*	.16
V_4 Score									
L H	107	18.6	5.3	.52	15.0	4.5	.44	3.6***	.52
L L	107	20.0	5.5	.54	16.0	4.7	.45	4.0***	.44
S H	107	18.5	5.9	.57	15.7	4.7	.46	2.8***	.44
S L	96	20.6	6.2	.63	15.0	4.7	.49	5.6***	.40
C	86	14.0	3.8	.41	12.3	3.3	.36	1.7***	.19

* Significant at the 5 per cent level of confidence
** Significant at the 1 per cent level of confidence
*** Significant at the 0.1 per cent level of confidence

TABLE 6

MEANS, STANDARD DEVIATIONS, AND STANDARD ERRORS OF MEANS FOR EACH TEST SCORE FOR EACH EXPERIMENTAL GROUP (COLLEGE METEOROLOGY CLASSES)

Group	N	Total Score			T_2 Score			V_1 Score			V_3 Score			V_4 Score		
		M	S.D.	SE_m	M	S.D.	SE_m	M	S.D.	SE_m	M	S.D.	SE_m	M	S.D.	SE_m
LH	33	53.4	16.2	2.87	35.8	10.9	1.93	17.7	5.8	1.02	17.4	5.4	1.02	18.4	6.0	1.05
LL	78	56.2	14.0	1.59	39.7	10.6	1.20	16.5	4.5	.51	19.2	5.7	.65	20.5	5.6	.63
SH	46	48.8	12.0	1.80	33.0	8.4	1.25	15.8	4.3	.64	15.8	4.5	.67	17.2	4.9	.73
SL	82	47.3	13.3	1.48	32.7	9.2	1.02	14.6	4.8	.53	13.8	4.9	.54	18.9	5.0	.56
C	85	41.1	13.9	1.52	27.7	9.8	1.07	13.5	4.9	.53	13.9	5.3	.58	13.8	5.2	.57

TENTATIVE CONCLUSIONS

The findings for the study may be summarized in the following way:

The more that is included in a film, the more will be learned, in absolute amount of that information (e.g., the V_1 score finding for Long Heavy group). However inferences about non-included but related information may make up for failure to present it explicitly in the film. The superiority of the Long Light or Short Heavy versions may be attributed to such inferences.

The data suggest that as more and more information is presented interferences are set up that result in less efficient learning of any particular part (e.g., the findings on the V_4 score - the Short Light Group generally did better than any other group on these items.)

Finally, it seems clear that packing more and more information into a film yields only very slight increments in total measured learning. In no case did the Long Heavy Group seem to learn anywhere near twice as much as the Short Heavy or Long Light Groups, nor did these latter learn twice as much as the Short Light Group.

Analysis of the test performance suggested that the films were rather difficult for the populations used, and observation of the attitude and performance of the groups suggested that they were not very well motivated or very interested. It should be noted that this interpretation is not inconsistent with the fact that the reading level of the scripts (as measured by the Dale-Chall formula) is at the seventh or eighth grade. These films seemed to be conceptually difficult. Furthermore, although each fact was couched in simple words, so many facts were presented per unit of time (about 4 per minute in the lightly packed versions) that grasping a large proportion of them was unlikely.

Another replication is planned employing pre-flight trainees who will have some background against which to assimilate a larger share of the information presented in these films. The subjects in the three replications conducted to date seemed to lack interest in and preparation for the material included in these films. This lack of interest and preparation may well have been the central factor responsible for the test findings.

A PRELIMINARY REPORT ON PROJECT NO. 17

PART I: CONTRIBUTIONS OF FILM INTRODUCTIONS TO LEARNING FROM INSTRUCTIONAL FILMS

C. W. Lathrop, Jr.

STATEMENT OF THE PROBLEM

Introduction

There is a certain amount of evidence to suggest that an oral introduction to a film for the purpose of orienting and motivating the audience, results in more learning. This raises the questions: (1) Is the introduction as provided within the usual instructional film equally valuable; (2) if not, can it be improved; and (3) what functions can it be expected to perform? These questions are expecially important relative to instructional tasks which are to be accomplished by sound motion pictures exclusively.

This study is primarily concerned with investigating the contributions to learning of some typical introductory sequences in extant instructional films.

Definition of Terms

A Film Introduction is defined as that portion of a film, excluding the main and credit titles, which begins the presentation, and runs up to the beginning of the body of the film.

The possible functions of an introduction to a film may be classified under the following 11 headings:

1. Stresses the importance of the material in the film.

2. Stresses the consequences if the material in the film is not learned. (For example, "If you don't pay close attention to this film the lives of your buddies might be endangered.")

3. Introduces the characters to appear in the film.

4. Poses the problem to be dealt with in the film.

5. Sets the stage, that is, orients the audience to the scene of the action.

6. Points out important features which will be developed in the film and to which the audience should pay

special attention.

7. Gets attention of the audience by some dramatic device.

8. Shows the trainee the relevance of the material in the film to what he has learned previously.

9. Explains to the instructor the situation for which the film is intended.

10. Provides additional inspiration which might motivate the student or trainee to undertake further activities after seeing the film.

11. Shows the purpose of the film. (Probably one of the most important functions of an introduction is to tell the student exactly what the film is about.)

The filmic techniques which may be used to attain these objectives may also be classified:

1. Live action (simple movement as from real life.

2. "Dramatic" live action (action used with dramatic effect)

3. Use of models (scale representations)

4. Animation

5. Flashes forward (short shots of scenes to follow are included in the introduction)

6. Titles to explain the film, etc.

7. Remarks by an authority on the subject

8. Narration by an off-stage commentator

9. Demonstration of a task being performed

10. Slow motion or speeded motion

11. Diagrams, still shots, tables, graphs

12. Audience participation (as in asking a question and allowing time for an answer)

PROCEDURE

Review of Film Introductions

One hundred and thirty instructional films with

introductions were viewed, and were analyzed and classified as to the following characteristics:

1. Length of the introductory sequences

2. Length of the entire film

3. Classification of film subject matter

4. Identification of the functions or objectives of the introduction

5. Identification of the filmic techniques used in the introduction

A check sheet was prepared to record each film analysis.

For the sake of convenience and uniformity the survey was restricted to films in the 8-13 minute time range.

Table I gives the classification of film introductions in terms of their functions, Table II shows the range of film techniques used, and Table III the lengths of the introductions in relation to total film length.

TABLE I

NUMBER OF FILM INTRODUCTIONS USING EACH OBJECTIVE

Objective	Coronet	Producers* EBF	CNFB	Castle	YAF	Others
Number of Films Analyzed	42	25	10	10	8	35
Stresses Importance	36	20	7	8	5	26
Stresses Consequence	3	-	-	1	-	3
Introduces Characters	32	9	7	8	3	20
States Problem	24	22	5	10	5	24
Sets Stage	13	5	5	-	3	16
Points out Important Features	1	2	1	-	1	2
Gets Attention	6	-	-	1	-	2
Shows Relevance to the Trainee	1	-	-	2	-	1
Explains to Instructor Situation for which Film was Intended	-	-	-	1	-	-
Additional Inspiration	-	-	-	-	-	1
Shows Purpose of the Film	-	-	-	-	-	-

* Producers:
EBF - Encyclopaedia Britannica Films
CNFB - Canadian National Film Board
YAF - Young America Films

TABLE 2

NUMBER OF FILM INTRODUCTIONS USING EACH TECHNIQUE

Film Technique	Producers* Coronet	EBF	CNFB	Castle	YAF	Others
Number of Films Analyzed	42	25	10	10	8	35
Dramatic Live Action	-	1	-	-	-	-
Live Action	41	21	6	10	5	31
Models	1	2	5	-	2	1
Animation	-	3	4	-	1	6
Flashes Forward	4	1	-	-	-	-
Titles	4	-	-	-	1	3
Authority	-	2	-	-	-	3
Narrator	42	23	10	10	8	32
Demonstration	8	5	-	7	2	8
Slow Motion	2	-	-	-	-	-
Diagrams	7	7	-	-	1	3
Audience Participation	-	-	-	-	-	-

* Producers
EBF - Encyclopaedia Britannica Films
CNFB - Canadian National Film Board
YAF - Young America Films

TABLE 3

RELATIVE LENGTHS OF INTRODUCTIONS TO TOTAL FILM FOOTAGE

		Producers*					
		Coronet	EBF	CNFB	Castle	YAF	Others
Number of Films Analyzed		42	25	10	10	8	35
Total Footage	Range	324-450	324-396	360-450	288-459	288-423	288-423
	Average	378	371	385	365	357	373
Introduction as Percentage of Total Footage	Range	3.62-32.44%	4.76-38.10%	7.89-39.94%	3.92-37.50%	7.09-36.94%	5.13-41.03%
	Average	12.54%	16.35%	21.75%	17.62%	13.71%	15.38%

*Producers:

EBF - Encyclopaedia Britannica Films
CNFB - Canadian National Film Board
YAF - Young America Films

The Films Used in the Experiment

The experiment proper was concerned with measuring the effect on learning of the introductory sequences of several typical instructional films.

The three films finally chosen as having what seemed to be the best available introductions were: (1) Sulphur and its Compounds, (2) Mammals of the Rocky Mountains, and (3) Rivers of the Pacific Slope.

Their characteristics are given in Table 4

TABLE 4

CHARACTERISTICS OF FILMS USED IN THE EXPERIMENT

Title	Total Film Length	Length of Introduction	Functions of Introduction	Film Technique used in Introduction	Subject Type
Sulfur and its compounds	387 ft. 10 min. 45 sec.	65 sec. 10.1% of total	(1) Stressing importance (2) Introducing characters (3) Setting the stage	(1) Live action (2) Models (3) Title (4) Narration	general science-chemistry
Mammals of the Rocky Mountains	369 ft. 10 min. 15 sec.	45 sec. 7.3% of total	(1) Setting the stage	(1) Live action (2) Animation (3) Narration	general science-biology
Rivers of the Pacific Slope	414 ft. 11 min. 30 sec.	25 sec. 3.6% of total	(1) Stressing importance (2) Setting the stage (3) Posing the problem	(1) Live action (2) Narration	general science-geography

Two experimental versions were prepared for each of the three films: Version I was the complete film; Version II was the same film minus the introductory sequence only. The preparation of the "no introduction" versions was a comparatively easy matter as, in each film, there was a fade-

out of the visuals and a break in the sound track between the credit titles and the introduction, and between the introduction and the main body of the film. The main title and credit titles were included in both versions of each film.

The Tests

Tests were constructed on the material in each of the three films, bearing on the facts in the body of the film only; no questions were asked on the facts contained only in the introduction. Multiple-choice test questions each with four choices were asked on three different classes of facts in the films:

(1) the facts contained in the visuals only
(2) the facts contained in the sound track only
(3) the facts found in both the visuals and sound track

Pilot-runs were made to check the validity and reliability of the tests, and poor questions were eliminated. Each test finally included from 50 to 60 items.

Test Population

Approximately 500 ninth grade high school students from the Lewistown and Lock Haven, Pa., High Schools took part in the experiment. Good cooperation from the schools made it possible to achieve a practical degree of randomization of the entire ninth grade population in each school into three groups. This was done by taking alphabetical lists of boys and girls respectively, and assigning students in rotation to experimental groups 1, 2, and 3. This procedure also gave a uniform number of boys and girls in each group.

One group acted as a control group and took the test without seeing a film. The second group saw the complete film (Version I), while the third group saw the "no-introduction" version (Version II). The groups were rotated so that each group became a different experimental group for each of the three films. Thus, each group acted as a control group for one film, as a group seeing the version without the introduction for another, and finally, as a group seeing the entire film for the third. The groups were also rotated with respect to projection rooms and test administrators.

The test followed immediately upon the film-showing. Twenty-five minutes were allowed for its completion. Thus a single forty-five minute period provided ample time for showing a film, and giving the test.

SUMMARY OF RESULTS

The question to be answered in this experiment is: What contributions do the introductory sequences in these films make to learning? The complete results will be given in the final technical report; only summaries of the test scores will be given here.

TABLE 5

SUMMARY OF TEST SCORES

"Sulfur and Its Compounds"

	Control Group (No Film)	Film minus Introduction Group	Complete film Group
Number of Subjects	168	166	168
Mean Score	16.97	21.61	22.75
Standard Deviation	3.43	5.45	5.36
Standard Error of the Mean	.27	.42	.42

TABLE 6

SUMMARY OF TEST SCORES

"Mammals of the Rocky Mountains"

	Control Group (No Film)	Film minus Introduction Group	Complete Film Group
Number of Subjects	168	171	174
Mean Score	22.55	31.23	28.68
Standard Deviation	4.93	7.27	6.63
Standard Error of the Mean	.38	.56	.50

TABLE 7

SUMMARY OF TEST SCORES

"Rivers of the Pacific Slope"

	Control Group (No Film)	Film minus Introduction Group	Complete Film Group
Number of Subjects	165	167	164
Mean Score	16.23	22.96	24.77
Standard Deviation	4.10	5.95	6.70
Standard Error of the Mean	.32	.46	.53

These results indicate that the groups which saw the experimental films generally did somewhat better than the control groups which did not see the films. However the differences between the groups which saw the entire film, and those which saw the film minus the introduction were small. For two films the introductions apparently made small positive contributions ("Sulfur and Its Compounds" $\neq 1.14^{*}$, "Rivers of the Pacific Slope" $\neq 1.81^{**}$), while for the third film, "Mammals of the Rocky Mountains", the introduction apparently had an adverse effect on learning, the difference between the experimental groups being -2.55^{***}. This latter unexpected result was carefully checked and proved to be authentic.

CONCLUSIONS

The results indicate that among existing films, typical introductory sequences can make small positive contributions to learning, while in other instances introductions may have an adverse effect on learning, possibly through misdirecting the student's attention.

This shows that there is an urgent need for an experimental approach to the problems of producing film introductions, based on sound learning principles, which will make positive contributions to learning. These should help to offset shortcomings in methods of presentation when using films to supplement instruction, or as an exclusive means of instruction. The next step inthis direction could be an evaluation of the relative importance of the different functions which a film introduction might perform.

* Significant at the 6% level of confidence
** Significant at the 1% level of confidence
*** Significant at the 0.2% level of confidence

A PRELIMINARY REPORT ON PROJECT 17

PART II: CONTRIBUTIONS OF FILM SUMMARIES TO LEARNING FROM INSTRUCTIONAL FILMS

C. A. Norford

STATEMENT OF THE PROBLEM

Introduction

This study parallels the first part of research project 17 which investigated the effects of film introductions on learning from films. It is an attempt to evaluate the effectiveness of the summary in some typical instructional films, and to suggest what functions the film summary might be expected to perform in order to improve the film as an instructional tool.

Definition of Terms

The term "Film Summary" as used here, means a concluding sequence produced as an integral and purposeful part of the educational sound motion picture, which embraces one or more of the functions of review, recapitulation, statement of importance, and/or the issuing of a challenging note; it may also contain an " application" of the information, or contain new information not previously given in the film.

The film summary is usually preceded by a fade in the visuals, and a natural break in the sound track, which separates it from the body of the film proper. It does not include THE END title.

This investigation seeks answers to the following questions:

(1) What functions can film summaries be expected to perform?

(2) Which of these functions are performed most frequently by film summaries as currently produced?

(3) What film techniques are used most frequently to present summaries?

(4) What are the common practices in regard to length of film summaries in relation to the whole film?

(5) Are typical films with summaries as now produced, more effective as instructional tools than they would be without the summaries?

PROCEDURE

As a starting point a survey was made by questioning educators and psychologists, to determine the possible functions a film summary might be expected to fulfill. These may be classified under 6 main headings:

(1) Review - a mere topical outline of the film; a brief restatement of the organization of the film rather than of its informational content.

(2) Recapitulation - a brief repetition or restatement of the principal points in the film.

(3) Importance - Stressing the value of the information in the film to the viewer personally.

(4) Challenging note - the issue of a challenge to the viewer to apply the information in the film, or to seek further information, or undertake other activities. This heading would also include the posing of questions for thought or discussion.

(5) Application - the illustration of a point of information by a concrete example.

(6) New Information - the summary may contain information not previously given in the film, or it may relate the film to new material to follow.

The film techniques used in the presentation of film summaries were also listed as follows:

(1) Music - musical background behind commentary.

(2) Animation - use of drawings and charts, etc. involving movement.

(3) Narration - the off-stage voice of a narrator.

(4) Lip-synch - a person on the screen speaking, with synchronous recording of the speech.

(5) Live Action - simple movement as from real life.

(6) Still shots - photographs or drawings without movement.

(7) New Scenes - scenes not shown previously in the film.

(8) Flash backs - the reshowing of parts of scenes used in the body of the film.

(9) Questions - Asking questions, either by titles, or narration.

Review of Film Summaries

A survey of 131 one-reel instructional films was made, and 87 which included summaries were analyzed in detail and classified according to function, film techniques used, and length of summary in relation to total length. This information is presented in Tables 1, 2, and 3.

The Films Used in the Experiment

For use in the experiment to evaluate the effectiveness of the film summaries in some typical instructional films, the following films were selected:

(1) The Cell: Structural Unit of Life

(2) Magnetism

(3) Rivers of the Pacific Slope

These films appeared to contain examples of the best available summaries when considered in terms of current production practices.

The characteristics of these films are given in Table 4.

TABLE 1

FILM SUMMARIES CLASSIFIED BY FUNCTION AND PRODUCERS

Producer	Number of Films With Summaries	Number of Summaries Fulfilling Each Summary Function: Review	Recapitulation	Application	Importance	Challenging Note	New Information
Coronet	27	23	17	16	16	16	5
Encyclopaedia Britannica	20	13	6	14	14	8	6
Young America	6	3	3	4	3	3	1
Canadian Film Board	6	5	4	5	6	6	1
Hawley Lord	3	0	0	0	1	3	0
U. S. Office of Education	3	2	1	3	2	2	1
Army Signal Corps	3	3	2	3	1	0	0
Office of War Information	3	2	0	2	3	3	1
U. S. Coast Guard	2	1	1	2	2	2	0
Mahnke Productions	2	2	2	2	2	2	0
The Pennsylvania State College	1	0	0	0	1	1	0
McGraw-Hill Text	1	1	0	1	1	0	1
Metro Goldwyn Mayer	1	1	0	1	1	1	1
General Electric	1	1	1	0	0	0	0
Brandon Productions	1	1	1	1	1	1	1
French National Library	1	1	0	0	0	1	1
Edited Films, Inc.	1	1	0	0	0	0	0
Radio Corporation America	1	1	0	1	0	1	0
Columbia	1	1	1	0	0	1	0
Office of Coordinator of Inter-American Affairs	1	1	1	0	0	0	0
Burton Holmes	1	1	1	1	1	1	0
Teaching Aids Exchange	1	1	1	1	1	0	0
TOTALS	87	65	42	57	56	52	19
Per Cent of 87 Films		75%	46%	65%	64%	58%	22%

TABLE 2

FILM SUMMARIES CLASSIFIED BY FILM TECHNIQUES USED

Producer	Number of Films With Summaries	Music	Animation	Commen- tary	Live Action	Still Shots	Lip Sync	New Scenes	Flash- backs	Questions
Coronet	27	4	1	25	27	0	3	15	23	6
Encyclopaedia Britannica	20	2	5	19	20	1	1	13	12	0
Young America	6	5	2	5	5	1	1	5	3	1
Canadian Film Board	6	3	0	6	6	0	0	5	3	1
Hawley Lord	3	0	0	3	3	0	0	2	2	0
U. S. Office of Education	3	0	0	3	3	0	0	2	3	0
Army Signal Corps	3	0	0	3	3	0	0	0	3	0
Office of War Information	3	1	0	3	3	0	0	2	1	1
U. S. Coast Guard	2	0	0	2	2	1	0	0	2	0
Mahnke Productions	2	1	1	2	2	0	0	1	2	0
The Pennsylvania State College	1	0	0	1	1	0	0	0	1	0
McGraw-Hill Text	1	1	0	1	1	0	0	1	1	0
Metro Goldwyn Mayer	1	0	0	1	1	0	0	1	1	0
General Electric	1	0	0	1	1	0	0	0	1	0
Brandon Productions	1	0	1	1	1	0	0	1	0	0
French National Library	1	0	0	1	1	0	0	1	1	0
Edited Films, Inc.	1	0	0	1	1	0	0	1	0	0
Radio Corporation America	1	0	0	1	1	0	0	1	1	0
Columbia	1	1	0	1	1	0	0	1	0	0
Office of Coordinator of Inter-American Affairs	1	1	0	1	1	0	0	1	1	0
Burton Holmes	1	0	0	1	1	0	0	1	1	0
Teaching Aids Exchange	1	0	0	1	1	0	0	0	1	0
TOTALS	87	19	10	83	86	3	5	55	62	9
Per Cent of 87 Films		21%	11%	95%	98%	3%	6%	63%	71%	10%

TABLE 3

RELATIVE LENGTHS OF FILM SUMMARIES TO TOTAL FILM FOOTAGES

Producer	Number of Films	Total Footage Range	Total Footage Mean	Per Cent Summary Footage Range	Per Cent Summary Footage Mean
				%	%
Coronet	27	342 -411.6	387	1.6-15.5	7.2
Encyclopaedia Britannica	20	351 -405.6	384.6	.8-14.0	4.6
Young America	6	333 -389.4	352.2	.9-16.4	8.7
Canadian Film Board	6	354 -453	385.5	2.6-18.8	6.2
Hawley Lord	3	354.3-381	366.8	.8- 8.2	3.8
U. S. Office of Education	3	357 -447	401	.5- 4.5	3.0
Army Signal Corps	3	309 -417	363.8	7.9-17.2	12.4
Office of War Information	3	298.8-383.4	348.4	.6-21.0	8.0
U. S. Coast Guard	2	369 -423	396	4.1-15.7	9.9
Mahnke Productions	2	384 -387	385.5	21.6-24	6.0
The Pennsylvania State College	1		324		3.1
McGraw-Hill Text	1		328.2		9.6
Metro Goldwyn Mayer	1		378		6.0
General Electric	1		363		3.3
Brandon Productions	1		378.6		23.1
French National Library	1		330		6.4
Edited Films, Inc.	1		333		1.8
Radio Corporation America	1		456		3.9
Columbia	1		390		4.2
Office of Coordinator of Inter-American Affairs	1		390		13.8
Burton Holmes	1		365.4		6.6
Teaching Aids Exchange	1		347.4		8.6

TABLE 4

CHARACTERISTICS OF THE FILMS USED IN THE EXPERIMENT

Title	Total Film Length	Length of Summary	Function of Summary	Film Technique Used in Summary	Subject Type
The Cell: Structural Unit of Life	370 ft. 10 min. 15 sec.	1 min. 15 sec. 12.2% of total	Review Recapitulation Stresses Importance Challenging Note New Information	Music Animation Narration Flashbacks Live Action	General Science - Biology
Magnetism	398 ft. 11 min. 4 sec.	1 min. 5 sec. 9.8% of total	Review Recapitulation Application Stresses Importance New Information	Music Narration Live Action Lip Synch New scenes Flash-backs	General Science- Basic Principles of Magnetism
Rivers of the Pacific Slope	387 ft. 10 min. 45 sec.	1 min. 24 sec. 13.0% of total	Review Recapitulation Application Importance Challenging Note	Music Animation Commentary Live Action Flash-backs	General Science- Geography

For each of the three films, two experimental versions were prepared: I. The complete film; II. The same film minus the summary sequence only. The end title was retained in each version.

The Tests

Tests were constructed which were based on the information in the body of the film, and not on items appearing only in the summary. Multiple-choice questions with four alternatives were used, together with a proportion of true-false questions. A pilot study was made to determine the validity of the three tests, and the tests were revised and proved for use in the final study.

The test on The Cell contained 58 questions, 11 of which were true-false; the test on Magnetism contained 60 questions, eight of which were true-false; and the test on Rivers of the Pacific Slope contained 52 questions, all of which were of the multiple-choice type.

Test Population

Five hundred and sixty-one ninth grade students from three Pennsylvania high schools (Carlisle, Mechanicsburg and Hershey) were tested in this experiment. Good cooperation by the schools made it possible to achieve a practical degree of randomizing by splitting the entire ninth grade population of each school into three experimental groups. The same technique for randomizing used in Part I of this project, was also used here.

As in the study of Film Introductions, one group acted as a control group and took the test without seeing a film, while a second group saw the complete film (Version I), and the third group saw the film minus the summary (Version II).

The groups were rotated so that each group became a different experimental group for each of the three films. The rooms for film showings, and the test administrat.. were also rotated to distribute any differences which may have arisen from these variables.

The test followed immediately on each film showing, and thirty minutes were allowed for its completion. A single forty-five minute period allowed sufficient time for showing the film and administering the test.

SUMMARY OF RESULTS

The question which this experiment sought to answer was: What effects did the summary sequences in these three films have on learning?

The complete results will be given in the final technical report; here only summarized test scores will be presented.

TABLE 5

SUMMARY OF TEST SCORES

"THE CELL: STRUCTURAL UNIT OF LIFE"

	Control Group (No Film)	Film minus Summary Group	Complete Film Group
Number of subjects	192	184	185
Mean Score	24.67	33.00	33.57
Standard Deviation	5.65	7.19	8.52
Standard Error of the Mean	.41	.53	.63

TABLE 6

SUMMARY OF TEST SCORES

"MAGNETISM"

	Control Group (No Film)	Film minus Summary Group	Complete Film Group
Number of Subjects	184	185	192
Mean Score	32.94	37.00	38.93
Standard Deviation	8.99	8.66	8.57
Standard Error of the Mean	.66	.64	.62

TABLE 7

SUMMARY OF TEST SCORES

"RIVERS OF THE PACIFIC SLOPE"

	Control Group (No Film)	Film minus Summary Group	Complete Film Group
Number of subjects	185	192	184
Mean Score	17.10	24.95	25.25
Standard Deviation	4.34	6.86	6.30
Standard Error of the Mean	.32	.50	.47

These results indicate that the groups which saw the films did definitely better on the tests than the control groups which did not see the films. The differences were small between the groups which saw the complete films, and those which saw the films minus the summaries. For all three films the summaries apparently made small positive contributions to learning, the differences in favor of the films with summaries being as follows:

The Cell: Structural Unit of Life	≠ .573
Magnetism	≠1.92 *
Rivers of the Pacific Slope	≠ .30

It should be noted that only one of these differences (For the film Magnetism) reaches accepted levels of statistical significance.

CONCLUSIONS

The results suggest that these films, which includ- what seemed to be the best available summary sequences as produced today, are not materially better than they would be without the summaries.

In view of the fact that a review or summary of a lesson is generally accepted as being beneficial to learning, it is reasonable to assume that better results should be expected to accrue from film summaries.

This suggests the urgent need for some experimental work on the problems of producing film summaries, based on established learning principles, which will be more effective aids to learning, than the film summaries which were tested

* Significant at the 3% level of confidence

in this experiment.

As a final comment it might be observed that the failure of the summaries to have any noticeable effect on learning in this experiment, could perhaps be a result of the fact that these films are so tightly packed with factual information (a 60 item test was constructed on each 10 minute film with comparative ease). Thus the level of learning was comparatively low, and it is possible that the summaries could add little.

A PRELIMINARY REPORT ON PROJECT NO. 24

EFFECT OF REPETITIVE FILM PRESENTATIONS ON LEARNING

C. L. McTavish

STATEMENT OF THE PROBLEM

The repetitive showing of instructional films to increase learning is an accepted, although relatively untested, film utilization procedure. The purpose of this research study is to determine the increment in learning that may be attributed solely to one, two, and three repetitions of the film, over and above a single presentation.

EXPERIMENTAL DESIGN AND PROCEDURES

Four films were shown to each of four groups of college students in such a way that each group saw one of the films once, a second film twice, a third film three times, and a fourth film four times. No two groups saw the same film the same number of times.

The films. The films used were: Atomic Energy, Electrochemistry, Colloids, and Food and Nutrition. All were 10 minute, sound, black-and-white, Encyclopaedia Britannica releases.

Five-choice objective-type tests were prepared for each film.

The population. The experimental population included 319 college freshmen enrolled in 12 sections of the science survey classes at the State Teachers College, West Chester, Pennsylvania. Of the 319, 99 were men and 220 women.

Procedures. Two weeks before the scheduled film showings, the members of the experimental population were given a pretest covering all four films. This pretest was a scrambled form of the basic film tests.

For the film showings, the 12 sections were divided into four groups. Each group was shown the four films, from one to four times according to the schedule in Table 1.

TABLE 1

NUMBER OF PRESENTATIONS OF EACH FILM

TO EXPERIMENTAL GROUPS

Group	Film			
	Atomic Energy	Colloids	Electro-Chemistry	Food and Nutrition
I	1	2	3	4
II	2	3	4	1
III	3	4	1	2
IV	4	1	2	3

The classes participating all met three times a week, on alternate days (Monday, Wednesday and Friday, or Tuesday, Thursday, and Saturday). In each instance, the film was shown the required number of times in one class period, and the test on that film was administered at the next class period.

RESULTS

For a preliminary treatment of the data, the results for the four films were combined for each number of viewings. The scores for each film were converted to standard score form by taking them as deviates from the pretest mean of the whole sample (without respect to number of viewings). These scores were further converted into Z-scores by multiplying the standard scores by 10 and adding 50. Finally, the pretest and posttest Z-score means were calculated for each film for each number of viewings, and the average mean for the four films was calculated for each number of viewings. Thus, the mean Z-score for one showing is the sum of the mean Z-score for the group seeing Atomic Energy once plus the group seeing Colloids once plus the group seeing Electrochemistry once, plus the group seeing Food and Nutrition once, and divided by 4

The posttest - pretest gains for each number of showings, and the differences in learning gains as the number of showings were increased, are reported in Table 2.

TABLE 2

PRETEST AND POSTTEST CONVERTED (Z-SCORE) MEANS AND MEAN GAINS ON COMBINED FILMS TEST, BY NUMBER OF SHOWINGS (N = 319)

Number of Showings	Pretest Mean	σ_M	σ_{dist}	Posttest Mean	σ_M	σ_{dist}	Posttest-Pretest Gains	Differences in Gains: Increment From Added Showings	% Increment For Each Additional Showing
1	51.0	.52	9.3	63.0	.62	11.0	12.0*		
								4.2*	35.0%
2	49.6	.57	10.1	65.8	.57	10.1	16.2*		
								1.2	7.4%
3	49.4	.55	9.8	66.8	.60	10.7	17.4*		
								0.2	1.1%
4	50.0	.58	10.3	67.6	.66	11.8	17.6*		

* Significant at the 0.1% level of confidence

CONCLUSIONS

The following conclusions are justified:

1. These films were effective in teaching at least some of the tested information. After one showing only, there was a 12-point gain over previous knowledge (in standard scores). The pretest-posttest gain was significant at the 0.1 percent level of confidence.

2. Repeating the films resulted in greater learning. With every repetition there was a positive increment in the pretest-posttest gain. However, the contribution made by repetition of showings fell off rapidly after the first repetition. The first repetition resulted in a 35% increment over no repetition, the second a 7.4% increment over the first, and the third only 1.1% over the second. Furthermore, only the increment attributable to the first repetition is statistically significant.

The conclusion may be drawn that, for factual films of the kind used in this study, showing them twice results in appreciably more learning; showings after the first two contribute little more to learning, and the drop-off is very rapid.

PRELIMINARY REPORT ON PROJECT NO. 32

THE RELATIVE CONTRIBUTIONS TO LEARNING OF VIDEO AND AUDIO ELEMENTS IN FILMS

Harold E. Nelson

STATEMENT OF PROBLEM

The main purpose of this study was to discover how well students will learn and recall what they see in a film as compared with that they hear. Other sub-comparisons were between the test scores made by students who heard the sound track of a film in the dark as against those who heard it in the light. A further comparison was made between those who saw and heard a film which presented only the theory of the subject material and those who also saw and heard a second film showing these theories applied to problem situations.

PROCEDURE

Two extant films were used, the one "Theory of Flight" and the other "Problems of Flight." A test containing 65 items was constructed from both films. Some of the questions were verbal and others were pictorial. A group of judges made repeated viewings of the films and determined whether the answers to the particular test items were to be found in the pictures, in the sound tracks, or in both. They also determined whether the answers were to be found in "Theory of Flight," "Problems of Flight", or in both films.

The subjects used in this experiment were 430 Reserve Officer Training Corps students at The Pennsylvania State College. These students were randomly divided into 8 groups averaging about 54 to a group. These 8 groups were subjected to various kinds of presentations of the film materials as shown below, and then tested with a multiple-choice test. Aeronautical instructors aided in the test construction. The test was further validated by an item analysis.

TENTATIVE RESULTS

All of the data have not been subjected to statistical procedures as yet, so only mean scores for part of the results will be given in this report.

TABLE 1

FILM PRESENTATIONS GIVEN TO EACH

GROUP AND SCORES EARNED BY EACH GROUP

Group	Theory of Flight Video(saw)	Theory of Flight Audio(heard)	Problems of Flight Video(saw)	Problems of Flight Audio(heard)	Mean Score*
A (control group)	No	No	No	No	28.9
B	Yes	Yes	No	No	37.7
C	Yes	Yes	Yes	Yes	44.9
D	Yes	Yes	Yes	No	39.5
E_1	Yes	Yes	No	Yes (in dark)	42.5
E_2	Yes	Yes	No	Yes (in light)	40.7
F	No	Yes	No	Yes	33.6
G	Yes	No	Yes	No	37.8

*Possible score, 65

From the above results it appears that the films did contribute considerably to learning. Group C which heard and saw both films did materially better than any of the other groups. All of the groups did much better than Group A which served as the control group and did not see or hear either film.

Group B which saw and heard only the film "Theory of Flight" was outscored by groups C, D, E_1 and E_2 which were also exposed to various presentations of the film "Problems of Flight." This would seem to indicate that it is better in a training film to show not only the theory, but also to apply this theory to concrete problems.

Group E_1 earned a higher mean score than group D. E_1 saw and heard "Theory of Flight" and only heard "Problems of Flight". Group D heard and saw "Theory of Flight," but only saw "Problems of Flight".

The score for group E_1 is higher than that for E_2. Both groups heard and saw "Theory of Flight," but while E_1 heard rhe sound track only of "Problems of Flight" in the

dark, E_2 heard the sound track of "Problems of Flight" in the light. The causes for this advantage of hearing the sound track in the dark will be evaluated in the fuller report to follow.

In the comparison between groups F and G it is noted that Group G received the higher mean score. Group G only saw both films and group F only heard both films. As the films used in the testing are rather typical of training films, in that much of the material to be taught is seemingly carried by the verbal portion, the advantage shown in the results for the pictorial portion might indicate that more emphasis should be given to the visual element of instructional and informational films than is currently the practice.

BIBLIOGRAPHY OF REPORTS

A. Reports Completed

Incidental Reports

Incidental Report No. 1: Report on a 16mm Motion Picture Production Conference

Incidental Report No. 2: Some Aspects of Learning from Films

Requirements of Research on Instructional Films (Reprinted from Hollywood Quarterly, Spring 1948)

Progress Reports

Progress Report No. 9: Contains preliminary reports of Projects 3, 6, 9, and 10

Project Report No. 10: Contains preliminary reports of Projects 13, 14, 15 and 19

Progress Report No. 11-12: Contains General Summary of Trends of Results, Summary Report on Project 5 (Learning Theories in Relation to Film Research)

Note: Progress Reports 1-8 inclusive followed a different form and were not available for general distribution.

Technical Reports

SDC-7-1: Instructional Film Production, Utilization and Research in Great Britain, Canada, and Australia (Final Report Project 31)

SDC-7-2: Music in Motion Pictures: Review of Literature with Implications for Instructional Films (Final Report Project 8)

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A Critical Evaluation and Summary of Experimental Literature on Instructional Films: Part I: Research in Motion Picture Communication 1918-1948. (Final Report Project 4, ready January 1950)

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END