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TECHNICAL REPORT SDC 269-7-20

EFFECTS OF FILM-VIEWING PRACTICE ON LEARNING FROM INSTRUCTIONAL FILMS

(Rapid Mass Learning)

The Pennsylvania State College
Instructional Film Research Program
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FOREWORD

The results of this research indicate that students improve in their ability to learn from films as they have increased experience in training through films.

This means five things to the instructor:

1. Unguided practice in viewing films results in improvement of the group's ability to learn from other films.

2. When films are used as a "fill-in" or entertainment the student is permitted to develop habits of a passive observer rather than those of an active, participating learner. Instructors should emphasize that films are made to present information for the student to learn and that the student should try to learn as much as possible from the film.

3. Emphasis on the training value of films can be made by announcing that the film will be the primary means of covering the content or that tests are to follow the film showing.

4. Film utilization procedures should include time for reviewing those parts of a film that are not understood; however care should be taken not to repeat content that is already clearly understood -- repetition may result in boredom and lack of attention to future film showings.

5. Avoid note-taking.

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SUMMARY

The present study undertook to answer the following question: Does experience or practice in learning from films increase efficiency in learning from films? More particularly, does prior experience in viewing 44 films on general science topics increase the ability of a group of high school students to learn from four additional films on general science?

The opportunity to investigate this problem was provided by the procedures of a previous experiment in which three groups of high school students had each been instructed in general science by one of three different teaching methods:

1. Using 44 films as the exclusive means of instruction
2. Using the same 44 films plus study guides
3. Using conventional teaching methods (no films)

By showing the same three groups of students four additional general science films which none of the students had seen before, it was possible to determine the difference in learning gain on these four films which could be attributed to the prior experience of a group as (1) a films-only group, or (2) a films plus study guides group, or (3) a conventional methods group (no films).

The results of the experiment showed that the two groups previously taught by one of the two film methods were consistently superior to the one group taught by the conventional teaching method (no films); the learning increment resulting from the four additional films was greater for the two films groups than for the conventional methods group. In one-half of twenty comparisons made between film groups and the conventional methods group, differences in favor of the film groups were statistically significant. In the remaining ten comparisons, differences favored the groups with the previous film viewing experience in all but two cases, but were not statistically significant.

It seems clear from the results of the experiment, then, that even unguided practice in viewing films (as represented by the films-only group) results in improvement of the group's ability to learn from other films in the same subject matter field. This finding suggests that efforts directed toward development of skill in learning from films should meet with impressive results.

EFFECTS OF FILM VIEWING PRACTICE ON LEARNING FROM INSTRUCTIONAL FILMS

by

A. W. VanderMeer

INTRODUCTION

One of the relatively neglected areas of research in instructional motion pictures is the relationship between learning from films and the characteristics of the film viewer.

Studies have revealed that general intelligence and chronological age are positively correlated with efficiency in learning from films, but aside from its implications for a process of selection or elimination in deciding who shall be instructed by a particular film, this knowledge is of little practical value. On the other hand, the instructor who knows the answer to the following questions can improve his work with almost any group of trainees or students:

a. To what extent can a trainee acquire the skills required to learn most efficiently from instructional films?

b. What can an instructor do to teach trainees how to learn from films more efficiently?

An approach to the answers to such questions may be found in the investigation of an even more basic question: Does experience or practice in learning from films increase the efficiency of learning from films? If an experiment produces an affirmative answer to this question, the way is clear for the investigation of the effects of various kinds of experience upon the development of skill in learning from films.

In this study two groups of learners were compared with respect to their ability to recall facts presented to them in four instructional films dealing with general science topics. One group had previously seen an average of three different motion pictures per week (or a total of 44 films) in the course of a semester's instruction in general science. The other group had seen no science films related to the curriculum during the same period of time.

EXPERIMENTAL DESIGN AND PROCEDURES

The hypothesis to be tested might be stated in the form of a null hypothesis as follows: The mere experience of viewing numbers of motion picture films in an instructional situation will not result in any improvement in the ability to learn from different films shown subsequently in a similar context.

The opportunity to investigate this hypothesis came as a by-product of a study of the relative effectiveness of general science instruction by films exclusively, by films plus study guides, and by standard lecture-textbook methods.[1] In this earlier investigation, forty-four films selected on the basis of their technical excellence, pedagogical soundness, and relevance to the course of study in science were shown to ninth grade groups according to the schedule set forth in Table 1.

As a result of this earlier study, a special population existed. This population consisted of three groups of students:

(1) a group that had been taught a course in general science without the use of films

(2) a group that had been taught the course in general science by means of 44 films exclusively (no other instruction)

(3) a group that had been taught the course in general science by means of the 44 films plus the use of study guides[2]

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[1] VanderMeer, A. W. "Relative Effectiveness of Instruction by: Films Exclusively, Films Plus Study Guides, and Standard Lecture Methods," Technical Report SDC 269-7-13, The Instructional Film Research Program, 1950.

[2] In the earlier experiment, the study-guide group saw the same films as the films-only group, but in addition were given study guides. Each study guide provided for several types of student preparation for film viewing: (a) a rudimentary understanding of the general purposes of the film, and therefore, the lesson, (b) preliminary definitions of vocabulary items that seemed prerequisite to better understanding of the film, and (c) a survey of the important facts to be learned from the film as reflected in the study guide's questions.

Answering the questions in the study guide, and, in a sense, reading the study guide, forced the learner to verbalize at least a part of the information gained from the film.

TABLE 1

NUMBER OF CLASS PERIODS FOR EACH TEACHING UNIT

Number of Periods Allotted	Name of Unit
13	How are Plants and Animals Fitted to the Conditions Around Them? (Adaptation)
15	How Do Scientists Classify Living Things? (Classification)
10	How Do Living Things Behave? (Elementary Psychology)
12	How Do We Make and Use Electrical Current? (Elementary Electricity)

The present experiment consisted of showing four additional science films, which none of the students had seen before, to this same total population. It was then possible to determine the difference in learning gain which was attributable to the fact that a group had or had not seen 44 science films previously.

The Films. The four films used in the present experiment were:

1. How Man Made Day
2. Rivers of the Pacific Slope
3. Properties of Sulphur
4. Snakes

All four films were Coronet productions, and the running time of each was 10 minutes.

The Experimental Population. The entire ninth grade class of the Bellefonte (Pennsylvania) Public Schools participated in the experiment. The average age of the students was about 14 years and 5 months. The average intelligence quotient was approximately 103. Girls slightly outnumbered boys. In general, the subjects seemed fairly typical of students in other schools in the Middle Atlantic States.

The classes were conducted in groups ranging in number from 38 to 45. Of the six such classes, four had had film viewing experience as described previously; two had been taught by conventional methods without films. Statistical comparisons are based only on those subjects who (a) had been absent less than 25 per cent of the time during the previous semester, and (b) presented complete test data for tests on all four films. The application of these criteria reduced the number of subjects to 182, of which 99 were females and 83 were males.

The Tests. Two types of tests were given; namely, those for equating the groups and those for measuring the conceptual and factual learning resulting from the film viewing.

1. The equating tests. The test used as a measure of intelligence was the California Test of Mental Maturity, S Form, 1947.[3] This test is made up of four parts that measure non-language factors of intelligence, and

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[3] California Test Bureau, Los Angeles, California

three parts that measure language factors. The total test has an aggregate time limit of 62 minutes of which 22 are devoted to non-language measures. The test has a validity of .88 (correlation with Stanford-Binet).

The test of science achievement used in this study was the Calvert Science Information Test, Intermediate Form. It was selected because (a) it seems to be a reasonably valid measure of science achievement and (b) it has two equivalent forms. The co-efficient of reliability based on the split-half technique is .90.[4]

The Calvert test is not a timed test; however, all students completed it in the space of forty minutes.

In addition, a test made up of every fourth item in the tests based on the films was used as a measure of the degree of initial knowledge of the film material possessed by the students. This test contained four-choice multiple choice items, and was administered by classroom teachers during the last class meeting of the week before the experimental films were shown.

2. The tests based on the films. The characteristics of the film tests were as follows:

Test	Number of Items	Reliability[5]
Rivers of the Pacific Slope	52	.74
Properties of Sulphur	52	.64
How Man Made Day	34	.61
Snakes		
Verbal	47	.80
Identification Pictures	31	.27

[4] California Test Bureau, Manual of Directions, Calvert Science Information Tests, 1937, p. 2.

[5] These reliabilities are based on Kuder-Richardson formula 21, and should therefore be considered as minimum estimates of the reliability rather than the reliabilities themselves.

Each test employed multiple choice items exclusively; almost all items had four choices. Tests were intended to include items on each fact presented in the film. A committee consisting of the investigator and two graduate students viewed each film repeatedly over a period of weeks and continued to write test items until no more could be found. Special attention at several viewings of each film was paid to the sound and pictorial film elements individually.

One sub-section of the test on snakes consisted of having students view 2" x 2" slides of snakes (for 30 seconds each). The student was then asked to identify the snake pictured on the screen by selecting its name from a list of three, or by choosing the response "none of these."

Film Viewing Procedure. One film was shown on each of four successive days. Each of the three experimental groups (Conventional, Study Guide, and Films Only) consisted of two classes, one of which met in the morning, one of which met in the afternoon.[6]

On the first day all six of these classes saw How Man Made Day.

On the second day all six classes saw Rivers of the Pacific Slope.

On the third day all six classes saw Properties of Sulphur.

On the fourth day all six classes saw Snakes.

Classroom Management. All films were shown in the same adequately "blacked out" science classroom to regular class groups. Tests were administered there immediately after each showing.

The students were not told of the nature of the experiment, but were warned that the films they were to see were part of their regular science work, and that their test scores would be reflected in their final grades.

The classes were in the charge of the regular teachers, but the investigator was present as an assistant at all times.

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6 Since both black and white and color prints of each film were available, it was decided to show color prints to the three morning classes, and black and white prints to the afternoon classes. Thus, nearly equal numbers of subjects in each experimental method group saw each type of print (i.e., color and black and white).

Statistical Procedure. A separate analysis was made for males and females for each of the five film tests (see p. 11). A separate analysis for each sex seemed justified because of the possibility that the findings might be different for the two sexes.

No adjustment was made for the fact that some students saw color films while others saw black and white. Since there was both a color version and a black and white version for each film and, since nearly equal numbers of subjects from each experimental group saw both versions of each film, the effect of the black and white-color variable in the practice effect was experimentally ruled out.

The experimental groups consisted of intact junior high school classes. Since such groups are in general unequal with respect to ability and scholarship, four matching variables were selected as a basis for equating the groups. These were the equating tests noted above: California Language, California Non-Language, Calvert Science Information, and the pre-tests of the respective film tests.

Ten covariance analyses were then made: One for each film test for each sex. Two variances (mean squares), adjusted for the four matching variables (it is the adjustment for matching variables that distinguishes an analysis of covariance from an analysis of variance), were computed in each analysis: (1) the between variance of the three experimental groups, and (2) the within variance of the three experimental groups. A within variance among two or more groups is the combined variance of the total set of scores, each score being taken as a deviation from the mean of its own experimental group, and not as a deviation from the grand mean of all the groups. The between variance is based on the difference between a function of the total variance (the variance of the total set of scores, each score being taken as a deviate from the grand mean) and a function of the within variance. These functions are the products of the variances by their respective degrees of freedom. The ratio between the between variance and the within variance is designated as F. When the F ratio is large, we are inclined to attribute the differences observed among the experimental groups to the experimental conditions.

The final step in the analysis was to determine the t-ratios between pairs of experimental groups. A combined error estimate based on the pooled error variance of all three experimental groups (the square root of the within mean square) served as the denominator for each t-ratio. The numerator was the difference between the adjusted means, that is, the means adjusted or corrected for the matching variables.

RESULTS AND CONCLUSIONS

The object of the study was to determine whether there were any significant mean differences in learning increment resulting from the four films depending upon a group's prior experience as (1) a conventional teaching method group or (2) a films plus study guides group or (3) a films-only group.

Table 2 shows the mean scores made by the three groups on the film tests; table 3 shows the significance of differences. Of the 30 t-ratios obtained, 10 are significant on the 5.0, 1.0, or 0.1 per cent level. However, when the comparisons between groups subjected to the two different types of film experience are eliminated (the A B comparisons), we find significant differences in half of the remaining 20 comparisons (the A C and B C comparisons). Six of the ten comparisons between the Films Plus Study Guides and the Conventional (Non-Film) Groups are significant; four of the ten comparisons between the Films Only and the Non-Film Groups are significant.

All the comparisons except the two with the smallest t-ratios favor the groups having had extensive film viewing experience over groups not having had such experience. It can therefore be stated with a fairly high degree of confidence that the null hypothesis has been disproved. Apparently even relatively unguided practice in film viewing results in the improvement of the ability to learn from other films in the same subject matter field.

The inclusion of two varieties of film viewing experience permits the consideration of another hypothesis; namely, that the use of printed study guides in a film viewing situation will result in greater learning efficiency in subsequent similar film viewing situations than will relatively unguided film viewing. Since none of the differences between the two groups having film experience (the A B comparisons) approached statistical significance, it could hardly be stated with confidence that this hypothesis had been sustained by the data. However, seven of the ten comparisons do favor the Study Guides Group over the Films Only Group, and this difference is supplemented by the relatively better showing of the Study Guides Group in comparisons with the Conventional Group.

TABLE 2

ADJUSTED* MEANS ON FILM TESTS FOR THREE TEACHING METHODS

	Properties of Sulphur		Snakes		How Man Made Day		Rivers of the Pacific Slope	
	Males	Females	Males	Females	Males	Females	Male	Females
Films Plus Study Guides	27.16	22.91	29.24	28.09	21.27	18.20	27.62	24.16
Films Only	27.01	21.64	31.22	26.93	20.21	16.99	28.81	24.05
Conventional Teacher-Textbook	25.34	19.94	27.85	24.48	18.43	15.47	24.36	21.32

* Adjusted for California Language and Non-Language, Calvert Science Achievement, and Pretest.

TABLE 3

F- AND t-RATIOS FOR SIGNIFICANCE OF DIFFERENCES OF MEANS BETWEEN THE THREE METHODS GROUPS: FILMS AND STUDY GUIDES (A), FILMS ONLY (B), CONVENTIONAL METHODS (C)

Film Test	No. Cases	Sex	F- ratio #	t- ratio AB	t-ratio AC	t- ratio BC
Rivers	83	Males	7.34***	-.94	2.40*	3.99***
	99	Females	2.93	.08	2.22*	2.08*
Sulphur	83	Males	.95	.11	1.20	1.35
	99	Females	4.80*	1.09	2.67**	1.49
How Man Made Day	83	Males	3.38*	1.05	2.59**	1.98*
	99	Females	6.10**	1.48	3.50***	1.90
Snakes	83	Males	2.64	-1.23	.80	2.38*
	99	Females	4.40*	.90	2.94**	1.94
Snake Identification (slide test)	83	Males	.39	.31	.87	.71
	99	Females	.10	- .37	- .41	- .02

F- ratio for variability of the three methods means considered together.

* Significant at the 5% level

** Significant at the 1% level

*** Significant at the .1% level

IMPLICATIONS

Perhaps the most important implication of this study is the encouragement it gives to endeavors to train students to learn from films. If students are able almost unassisted to gain skill in learning from their film viewing experience, a little effort toward the direct development of skill in learning from films should meet with impressive results.

The next step would seem to be the establishment of the content and methodology for instruction to improve learning from films. This should be done within the larger context of instruction in the basic training course subjects.