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ABSTRACT

In planning media systems for individualized study it is valuable to know if printed materials are as effective as projected materials in promoting student recall. An experiment to compare printed and projected materials utilized subjects from graduate school, the tenth, and the twelfth grade. Subjects were tested on images in either printed or projected form under controlled conditions. Projected stimuli scored higher than printed ones, but not significantly at the .05 percent level. It is concluded that in general printed images are as effective as projected ones. (RB)

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PROJECTED VERSUS PRINTED STIMULI: THEIR EFFECT ON STUDENT RECALL

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Educators need reliable information to help them select the best teaching materials. Of special interest is information that will enable the selection of media for use in individualized instruction. Very little systematic research has been done to determine whether any one type of media is more effective than another.

In planning media systems for individualized study it would be valuable to know whether printed materials are as effective as projected materials or whether the difference in effectiveness is enough to merit the greater expenditure needed to install equipment for projected materials.

A study by Severin¹ has shown that the effectiveness of various combinations of media can be compared and yield statistically significant results. Whereas Severin's study focused on various combinations of media, this study will concentrate on the relative effectiveness of two types of media only.

An experiment by Ter Louw² has shown that using large projected images resulted in a higher degree of interest and learning than using smaller projected images. From his study it would seem that the magnitude of the image is an important factor in attracting attention and affecting recall. Whereas Ter Louw was concerned with projected stimuli for group instruction, this study was designed to determine whether projected stimuli (large image) were more effective than printed stimuli (small image) in a recall situation.

In a study by Calder³ various combinations of media were used for self-instruction in a specific task to determine whether any of the combinations were more effective than others. The results of his study indicated that there was no significant difference in the abilities of students to perform the task regardless of the combination used but that some combinations were more effective when transfer of learning was measured.

The purpose of this study was to determine whether printed visual stimuli are as effective as projected visual stimuli on recall. Teachers frequently feel that media involves expensive equipment to produce effective results. It is hoped that the results of this study will show that printed images are as effective and less costly.

The hypothesis to be tested was that there is no significant difference between the responses of students who viewed the projected visual stimuli and those who viewed the printed visual stimuli.

Experimental Design and Procedures

Subjects involved in this study included 37 graduate students in two classes, Ed. 319, Audiovisual Media in Education, and Ed. 419, Preparation of Audiovisual Instructional Media, taught in the School of Education at the University of Connecticut; 23 students enrolled in 12th grade English at Manchester High School, Manchester, Connecticut; and 36 students in 10th grade English at E. O. Smith, the University High School, in Storrs, Connecticut. Each of the three groups, designated as A, B, and C in the above order, was given a practice viewing and response period under the same conditions by way of explanation and was then divided randomly into two subgroups, I and II.

The stimuli used in this study were composed of simple, universally-recognizable symbols. No special knowledge was required to interpret the information; therefore, the level of education and experience would not affect the performance of the various groups. One group of 20 color slides (35mm) and one group of 20 color prints (8"x10") were produced for use with the three major groups. The prints were duplicates of the slides. The slides and prints were arranged in random order in two series of twenty visual stimuli. Series No. I consisted of Visual No. 1 in projected form, Visual No. 2 in printed form, Visual No. 3 in projected form, and

so on alternately. Series No. II consisted of Visual No. 1 in printed form, Visual No. 3 in projected form, and Visual No. 3 in printed form, and so on alternately. Subgroups I were subjected to Series No. I, and Subgroups II were subjected to Series No. II.

Variables which were held constant in the study included lighting conditions, time, image size and viewing distance.

All subjects were tested under controlled conditions with viewing and response times for each visual stimulus limited to 5 seconds for viewing and one minute for immediate response. The subjects were asked to list all components of the previously viewed visual stimulus. The completeness and accuracy of the responses were evaluated and the data was analyzed using the t-Test for Paired Observations.⁴

Formula:

$$t = \frac{\sum_i D_i}{\frac{N \sum_i D_i^2 - (\sum_i D_i)^2}{N - 1}}$$

Results

The mean scores of Group A (graduate students) are presented in Table I. These data indicate that the mean score for projected stimuli was slightly higher than for the printed stimuli. However the t-test shows that the difference was not significant at the five percent level.

Group B (12th grade) had a mean score of 97.00 for projected stimuli and a mean score of 102.04 for printed stimuli. This difference was significant at the .05 level in favor of the printed visual stimuli. (See Table II)

Table I
 STATISTICAL DIFFERENCES BETWEEN SCORES OF ALL SUBJECTS
 IN GROUP A (Graduate Students)

Method	Number	Standard Deviation	Mean Score	t
Projected Stimuli	37	9.42	100.89	0.9702*
Printed Stimuli	37	8.93	99.97	

*Not significant at the 0.05 level

Table II
 STATISTICAL DIFFERENCES BETWEEN SCORES OF ALL SUBJECTS
 IN GROUP B (12th Grade)

Method	Number	Standard Deviation	Mean Score	t
Projected Stimuli	23	6.99	97.00	4.0806*
Printed Stimuli	23	8.24	102.04	

*Significant at the 0.05 level

Table III
 STATISTICAL DIFFERENCES BETWEEN SCORES OF ALL SUBJECTS
 IN GROUP C (10th Grade)

Method	Number	Standard Deviation	Mean Score	t
Projected Stimuli	36	10.87	100.42	0.5314*
Printed Stimuli	36	11.53	99.86	

*Not significant at the 0.05 level

Table IV
 STATISTICAL DIFFERENCES BETWEEN SCORES OF ALL SUBJECTS
 (Groups A, B, and C)

Method	Number	Standard Deviation	Mean Score	t
Projected Stimuli	96	9.54	99.78	-.9835*
Printed Stimuli	96	9.79	100.43	

*Not significant at the 0.05 level

In Table III the mean scores of the two methods show a slight difference between the projected and printed visual stimuli favoring the projected images. This small difference was against the hypothesis, but was not statistically significant at the .05 level.

Table IV summarizes the results of all subjects involved in this study. A comparison of the overall mean scores of 99.78 for projected stimuli and 100.43 for printed stimuli indicates that there is a slight difference between the two methods favoring the printed visual stimuli. However this slight difference was not statistically significant at the .05 level and the hypothesis is retained.

Conclusions

This study was an exploratory approach in a relatively untested area measuring responses to projected and printed images and their effect on information recall. The major conclusions from this study may be summarized as follows:

1. In two of the three groups tested no significant differences existed between the two methods used when recall of items was measured.

2. One of the three groups showed a significant difference between the two methods; therefore it can be concluded that the printed images were more effective than the projected images in this case.
3. Since the results did not show a significant difference between the mean scores of all subjects it can be concluded that printed images are as effective as projected images.
4. On the basis of the present data, it would appear that presenting instruction by the use of printed images such as study prints, series of diagrams and sequenced pictures can be as effective as sequenced slides or filmstrips. This information applies to situations of independent study.
5. A practical implication of the findings is that further research should attempt to identify more precisely whether learning is affected by the choice of either printed or projected images.

References

1. Severin, Werner. "The Effectiveness of Relevant Pictures in Multiple-Channel Communication." *AV Communication Review*. 1967. 15:4
2. Ter Louw, A.L. *Legibility Standards for Projected Material*. Notes from an Address before the Indiana State Conference on School Planning and Audio-Visual Education, Bloomington, Indiana. 1956.
3. Calder, Clarence R., Jr. "A Comparison of the Relative Effectiveness of Five Self-Instructional Techniques in Teaching a Psychomotor Skill." *Educational Technology*. 1967. 14-19.
4. _____ . *Tele-Storage and Retrieval System Users Manual*. Duke University, Computation Center. November, 1967. p. 56.

BLACK AND WHITE SAMPLE OF STIMULUS MATERIALS

**2x2" color slides were used for the projected images
the non-projected stimuli were presented in the form
of identical 8x10" color flip charts**

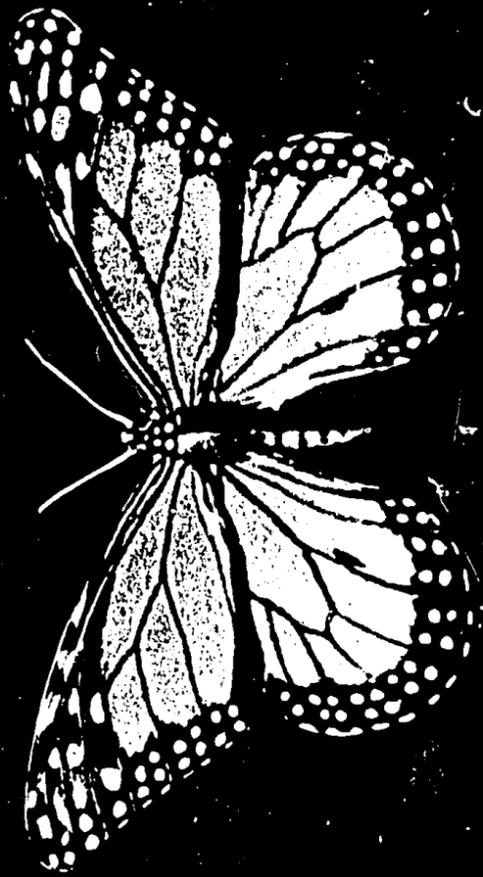
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