DOCUMENT RESUME

ED 256 305 IR 011 625

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TITLE Prose-Relevant Pictures and Older Learners' Recall of Written Prose.
PUB DATE [Jan 85]
NOTE 15p.; Paper presented at the Annual Convention of the Associ on for Educational Communications and Techno_. y (Anaheim, CA, January 17-23, 1985). For entire proceedings, see IR 011 621.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Graduate Students; Higher Education; Media Research; *Pictorial Stimuli; *Prose; *Recall (Psychology); Time Factors (Learning); Visual Learning

ABSTRACT

A two-experiment study investigated the possible contribution of prose-relevant pictures to the recall and retention of information presented in written prose materials with older learners as subjects. In the first experiment subjects were 52 graduate students from a southeastern university. Recall of information presented in written prose materials was assessed immediately following presentation of a prose-plus-picture (or prose-only) passage and again, 14 days later. The second experiment used 47 other graduate students and was similar to the first, but the delayed test was administered 26 days following the immediate test. Results suggest prose-relevant pictures do contribute to older learners' increased recall of prose materials. In both experiments, students who read prose passages and viewed accompanying pictures remembered more of the information that was pictured and included in the prose passages than students who read the same prose passages without the pictures. Facilitative picture effects were observed in both immediate and delayed testing conditions. Seven references and one picture are included. (Author/LMM)

Prose-Relevant Pictures and Older Learners' Recall of Written Prose

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Running head: PICTURES AND RECALL

Abstract

Research examining the contribution of pictures to young children's recall of prose materials suggests that pictures can be used to facilitate the recall of information presented in prose passages. Can positive effects found with young children be extended to older learners? If picture effects are present, are they durable over time? Data collected from two experiments including college students provide evidence for an affirmative answer to both questions.

Prose-Relevant Pictures and Older Learners' Recall of Written Prose

There is now substantial evidence that pictures can be used to facilitate the recall of information presented in prose materials. Levie and Lentz (1982), in a major review, concluded that "when illustrations provide text-redundant information, learning information in the text that is also shown in pictures will be facilitated" (p. 225). The reviewers reported that the average improvement was 36% for groups reading with pictures in comparison to groups reading text alone. Most studies reported in the literature investigating the contribution of pictures to prose learning have used younger learners (grades K-6) as subjects (Alesandrini, 1984; Levie & Lentz, 1982; Levin, 1981; Levin & Lesgold, 1978). In the Levie and Lentz review, 23 studies examined learning illustrated text information. Of these 23, only three included more mature learners (i.e., post-secondary school learners) as subjects. Additional studies with older learners are needed in order to determine if the results with young children can be generalized to other audiences.

This study investigated the possible contribution of prose-relevant pictures to the recall and retention of information presented in written prose materials with older learners as

subjects. The first variable considered in this investigation was the extension of the positive picture effects found with young children to college-age students. The second variable considered the durability of the picture effects. Peng and Levin (1979) suggested that "in order to prove implications for classroom learning situations, it must be demonstrated that gains attributable to pictures are not short-lived" (p. 39). The durability of picture effects with second and fourth graders over a 3-day period has been demonstrated (Levin & Berry, 1980; Peng & Levin, 1979).

In this study two experiments using older students as subjects were conducted. In the first experiment, recall of information presented in written prose materials was assessed immediately following presentation of a prose-plus-picture passage (or prose-only passage) and 14 days later. The second experiment was similar to the first but the delayed test was administered 26 days following the immediate test.

Experiment 1

Method

Subjects and Design. Fifty-two graduate students from a southeastern university were randomly assigned to either a prose-plus-picture (27 subjects) or prose-only (25 subjects)

group. In the prose-plus-picture condition, the students read the prose passages and viewed the accompanying pictures. In the prose-only condition the subjects read the prose passages without the pictures.

Materials. Three human interest stories were chosen from Time, a weekly news magazine. The passages were approximately one-half to three quarters of a page in length, typed and double-spaced. One article described an individual who had set up residence on a traffic island on Manhattan. Another was about skateboarding in Madison, Wisconsin, and a third described a neighborhood's solution to waiting in long lines so that their children could see Santa Claus in a department store.

For each passage, a single, 8 and 1/2 by 11-inch line drawing was produced to represent or duplicate the passage information. Levin (1981) has described the representation function of pictures as that of making the prose passage more concrete. The picture was presented on the page following the prose passage. The picture used for the traffic island passage is presented in Figure 1.

Insert Figure 1 about here

Five short-answer paraphrase questions were constructed for each passage using Anderson's (1972) recommendations. The

questions tested recall of information that was presented in the passage and specifically pictured. The five test questions for each passage were reproduced on three separate pages. The title of the passage appeared at the top of the appropriate test. Prior to Experiment 1, the 15-item test was administered to a group of 16 graduate students to verify that subjects would not be able to answer correctly the questions without reading the prose passages and/or viewing the pictures. Average recall for the 16 graduate students was 3%.

Procedure. The treatments were administered in a group format. Instructions were printed on the cover sheet accompanying each of the three prose passages (and pictures if appropriate). Subjects in the prose-plus-picture group were instructed to read the passage and view the accompanying picture once. Prose-only subjects were instructed to read the passage once. Subjects read the material at their own pace. Subjects were asked to raise their hand when they had completed the task. The experimentor collected the instructional treatment and administered the appropriate 5-item test. A similar procedure was used for passages two and three. Fourteen days later the students were tested in the same manner, with the same 15-item test as used in the immediate condition (five items per passage).

Results and Discussion

After Experiment 1 was completed, a problem was identified with regard to one of the 15 test items. Based on information presented in the prose passage, more than one correct response was possible. As a result, the item was deleted from the analysis.

The first analysis compared the prose-plus-picture group with the prose-only group for the immediate and delayed testing conditions. One-tailed significance tests were used based on the direction of differences found in previous studies with young children and the limited number of studies done with adults. In the immediate testing condition, the average recall of prose-plus-picture subjects (88%) was significantly higher than that of control subjects (75%), t (50) = 4.00, $p<.001$ (one-tailed). For the 14-day delayed testing condition the average recall of prose-plus-picture subjects (87%) was also significantly higher than that of prose-only subjects (71%), t (50) = 4.96, $p<.001$ (one-tailed).

The second analysis was performed to determine if a significant amount of information was lost over the 14-day delay for both the prose-plus-picture and prose-only groups. Prose-plus-picture subjects' average recall of information in the immediate (88%) and delayed (87%) conditions was not

statistically different, $|t|<1$. In the prose-only condition, the average recall for subjects was 75% and 71% for the immediate and delayed testing conditions, respectively. When subjected to a paired t-test this difference was significant ($t(24) = 2.12$, $p<.05$ (two-tailed)). Picture effects were observed in the immediate and 14-day delay conditions while a significant amount of information was lost over time only in the prose-only group.

Experiment 2

The second experiment was conducted to determine if the results observed in Experiment 1 would be similar if the time between administration of the treatments and the delayed test was extended. Materials, methods and procedures were similar to Experiment 1 but the time between the immediate and delayed test was extended to 26 days.

Method

Subjects and Design. A different group of forty-seven graduate students from the same southeastern university as subjects in Experiment 1 were randomly assigned to prose-plus-picture (22 subjects) and prose-only (25 subjects) groups. As in Experiment 1, students in the prose-plus-picture condition read the prose passages and viewed the accompanying pictures. In the prose-only condition, subjects read the prose passages without pictures.

Materials. The prose passages and pictures used in Experiment 1 were also used in Experiment 2 (three passages, three pictures). In addition, the same 15-item test was used. The one problematic item observed in Experiment 1 was rewritten.

Procedure. The treatments were administered in the same manner as they were for the first experiment. Testing was done immediately following completion of the treatments and 26 days following the administration of the treatments.

Results and Discussion

Significant picture effects were identified in both the immediate and delayed testing conditions. In the immediate testing condition, the average recall of prose-plus-picture subjects (89%) was significantly higher than that of prose-only subjects (79%), $t(45) = 3.60$, $p<.001$ (one-tailed). For the delayed testing condition (26-day delay) the average recall of prose-plus-picture subjects (75%) was also significantly higher than that of prose-only subjects (61%), $t(45) = 3.91$, $p<.001$ (one-tailed). Average recall was lower for both groups in the delayed testing condition. Prose-plus-picture subjects' average recall in the immediate (89%) and delayed (75%) conditions was statistically different, paired $t(21) = 9.01$, $p<.001$, two-tailed. Prose-only subjects' average recall in the immediate (79%) and delayed (61%)

conditions was also statistically different, paired $t(24) = 9.58$, $p<.001$, two-tailed. Picture effects were durable over the 26-day delay, but both groups lost a significant amount of information.

General Discussion

Results of this study support the claim that prose-relevant pictures do contribute to older learners' increased recall of prose materials. In two experiments, graduate students who read prose passages and viewed accompanying pictures remembered more of the information that was pictured and included in the prose passages than those students who read the same prose passages without the pictures. Facilitative picture effects were observed in both immediate and delayed (Experiment 1, 14-day delay; Experiment 2, 26-day delay) testing conditions. The prose-plus-picture groups retained more information over the 14-day (Experiment 1) and 26-day (Experiment 2) delays than the prose-only group. In the 14-day delay condition the prose-plus-picture group, in contrast to the prose-only group, did not lose a significant amount of information. While both the prose-plus-picture and prose-only groups' average recall was significantly lower for the 26-day delayed testing condition (Experiment 2) than in the immediate testing condition, the difference between the average recall of prose-plus-picture subjects and prose-only subjects increased.

Levin (1981) has argued that subjects' increased recall in prose-plus-picture conditions in contrast to prose-only conditions may be due to greater memory trace strength in the prose-plus-picture condition. He stated, "According to the representation function, pictures lay down a 'memory trace' that ... is stronger than that associated with a strict verbal representation of the text" (Levin, 1981, pp. 214-215).

Findings of the current study are consistent with studies reported by Levin and Berry (1980) and Peng and Levin (1979), in which the subjects were children and prose passages included human interest and novelty stories. In the current investigation average recall for prose-plus-picture subjects was 10%-16% higher than that of prose-only subjects. Levin and Berry and Peng and Levin reported similar results (13%-20%). In both the Levin and Berry and Peng and Levin studies, representational pictures were used in the picture conditions.

The magnitude of the picture effects observed in this study were lower than the average improvement (36%) reported by Levie and Lentz (1982). This lower average improvement may be due to ceiling effects present in both experiments. In Experiment 1, prose-plus-picture subjects' average recall of information in the immediate and delayed testing conditions was 88% and 87%,

respectively. Similar ceiling effects were observed in Experiment 2. Alternatively, some of the pictures included in the 23 studies reviewed by Levie and Lentz may not have functioned as representational pictures using Levins' (1981) definition. Finally, as Levin and Berry (1980) have suggested, the particular type of prose passages (human interest stories) may have affected the size of the picture effects.

Can positive picture effects found with young children be extended to older learners? If found, are the positive picture effects durable over time? Results from this study provided support for an affirmative answer to both questions. Further extension of the findings to other audiences, for example, adult learners who are not involved in formal school settings, is needed. The limits of the durability of positive picture effects warrants further study. If individuals, in fact, can remember more information over extended periods of time reading prose with pictures, then these results would have practical implications for educators, instructional designers and others involved in the educational process.

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Figure 1. Picture Accompanying One of the Prose Passages in Experimental Condition.