“Advance” advance organizers

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Two experiments were conducted in which subjects read and paraphrased an advance organizer under one of three conditions: (1) 48 h prior to reading organizer-relevant text, (2) 1 h prior to reading organizer-relevant text, and (3) immediately prior to reading organizer-relevant text. A fourth condition (4) was a control in which no organizer was available. The results of both experiments indicated that subjects in the experimental conditions recalled significantly more text content than subjects in the control conditions. Significant quadratic trends were observed among the experimental conditions in both experiments. The results support a knowledge activation and integration view of advance organizers.

Despite a massive literature on advance organizers (see, for example, Mayer, 1984, for a review), some questions about their efficacy remain to be resolved. One question in particular stems from the observation that research on advance organizers almost inevitably has placed advance organizers immediately prior to to-be-learned material. There seems, however, to be no compelling theoretical reason why advance organizers should immediately precede to-be-learned text. Derry (1984), for example, has suggested that advance organizers function by activating text-relevant schemata. Later, when the text is encountered, information consistent with the schemata is assimilated while simultaneously inconsistent information is added in the form of discrete schema corrections. From this perspective (see also Mayer, 1984), the time at which the organizer is presented should matter only in terms of the rapidity with which the organizer-activated schemata are reactivated through a text encounter.

There seems to be no reason why substantial delays between the reading of an organizer and the reading of organizer-relevant text should eliminate the organizer's effectiveness. Indeed, some of Ausubel's early work involved considerable delays between organizer and text reading (see Ausubel, 1968).

From a theoretical perspective, a comparison of the effectiveness of organizers read at different time intervals prior to encounters with to-be-learned text would allow for a further test of knowledge activation and integration theories of the functioning of advance organizers (see Ausubel, 1968; Derry, 1984; Mayer, 1984). This general position holds that once an organizer has activated relevant schemata in which the subsequent text will be assimilated, the activation should remain effective until the reader forgets the organizer, as well as which aspects of his or her knowledge base were activated by the organizer. From this point of view, then, one would predict that ad-

vance organizers read at substantial intervals (e.g., 48 h, 1 h) prior to the reading of associated text would still have a facilitative effect on the ultimate recall of text material.

To this point, we are unaware of studies that have contrasted the effects of advance organizers (or other schema-activation techniques) given well before organizer-relevant text with organizers given immediately prior to reading to-be-learned material. The current study, therefore, was designed to determine whether delays imposed between the reading of an advance organizer and to-be-learned text would influence the organizer's effectiveness. We predicted that the most effective arrangement of events would be the reading of the organizer followed immediately by reading of the text. We also predicted that advance organizers would have a facilitative effect on readers' recall of text when reading the text was delayed both 1 h and 48 h after the reading of the advance organizer. Simply because we expected forgetting to occur, and because we anticipated that the knowledge activation cues provided by advance organizers might become less available across time, we expected the effectiveness of organizers to adhere to the following pattern: organizer + no delay > organizer + 1-h delay > organizer + 48-h delay > control (no organizer).

METHOD

Subjects and Setting

The subjects were 96 elementary education majors in Experiment 1, and 60 in Experiment 2. All subjects participated for course credit. All data were gathered in the subjects' regular classrooms, in classrooms immediately adjacent to their regular classrooms, or in a nearby office. Data were gathered across a 4-week period from groups of 2 to 14 subjects.

Materials

The essay used in Experiment 1 was originally developed by Petersen, Glover, and Ronning (1980). It described the formation of the solar system at the college-sophomore level of difficulty. A 117-word advance organizer for the essay originally constructed by Dinnel and Glover (1985) was employed. This organizer had been developed on the general basis of Ausubel's (1968) descriptions. In Experiment 2, a widely used 1,200-word essay originally developed by Bruning (1968) was used.

Copies of stimulus materials are available upon request. Correspondence should be addressed to John A. Glover, Teachers College and Burris Laboratory School, Ball State University, Muncie, IN 47306.

This essay described aspects of a fictional African nation, Mala. A 100-word advance organizer developed by Corkill, Glover, and Bruning (1989) was employed.

Procedure

The procedures were highly similar in both experiments. The subjects were randomly assigned to one of four conditions: advance organizer + 48-h delay, advance organizer + 1-h delay, advance organizer + no delay, and control (no organizer). In each of the conditions, the subjects were told that they were participating in a memory experiment and that they would be reading a brief passage they would be tested over. The subjects proceeded at their own rates in all conditions, because efficiency of learning (i.e., amount of recall/time in processing) was not our issue of concern. In all the experimental conditions, the subjects were asked to paraphrase the organizer in writing at the time they read it. This was done to ensure that the subjects carefully attend the organizer. In the 48-h delay condition, the subjects read and paraphrased the organizer. Then, they were instructed to return in 48 h to the same location, where they would read a brief essay. They were further told that the brief paragraph they had just read might help them comprehend the subsequent essay. Subjects in the 1-h delay condition were given highly similar instructions, except that they were asked to return in precisely 1 h for their reading. The subjects in the no delay condition were given similar instructions, except that no mention of any delay was made. The subjects in this condition were allowed to proceed immediately from the organizer to the text. The subjects in the control conditions merely read the text without benefit of the organizer. All subjects were allowed to read and study at their own paces. When they had completed the passage, they raised their hands. Subsequently, the experimenter collected their materials and administered a free recall posttest.

RESULTS

The subjects' protocols were scored by two raters on the number of idea units they recalled from the essay in Experiment 1 ($\kappa = .94$) and Experiment 2 ($\kappa = .90$). An idea unit was scored as correct if subjects recounted its gist in their protocols. The average of the two raters' scores was employed in subsequent analyses.

Three orthogonal analyses were performed on the data from Experiment 1 (see Table 1). The first analysis was a one-way analysis of variance (ANOVA) between the control condition and the three experimental conditions. This analysis indicated a significant difference [$F(1,94) = 27.58$, $MS_e = 10.88$, $p < .01$]. Another one-way ANOVA was performed on the data from the three ex-

perimental conditions. This analysis indicated a significant difference among the conditions [$F(2,69) = 20.07$, $MS_e = 7.97$, $p < .01$].

Since time was treated as an ordinal variable, a trend analysis was performed to clarify its effect. The trend analysis indicated that a linear trend was significant [$F(1,69) = 4.85$, $MS_e = 7.95$, $p < .05$], explaining 4.13% of the total variance. The quadratic trend was also significant [$F(1,69) = 35.30$, $MS_e = 7.95$, $p < .01$], explaining 30.09% of the total variance. Thus, it appears that a quadratic trend best describes the relationship between delay after exposure to an advanced organizer and recall of to-be-learned text.

The data from Experiment 2 (see Table 1) were analyzed in the same manner as those from Experiment 1. A significant difference was observed in the contrast of the control condition with the three experimental conditions [$F(1,58) = 34.35$, $MS_e = 5.35$, $p < .01$]. The contrast of the three experimental conditions also indicated a significant difference among conditions [$F(2,42) = 15.90$, $MS_e = 3.24$, $p < .01$].

The trend analysis indicated a nonsignificant linear trend [$F(1,42) = 1.48$, $MS_e = 3.24$] and a significant quadratic trend [$F(1,42) = 30.32$, $MS_e = 3.24$, $p < .01$], explaining 41.08% of the total variance. Again, the quadratic trend seemed to best describe the relationship between the delay after exposure to an advance organizer and recall of the to-be-learned text.

DISCUSSION

The results of both experiments partially confirmed our hypotheses. That is, advance organizers, whether read 48 h, 1 h, or immediately prior to to-be-learned materials, facilitated students' recall of the text material associated with the organizers. The significant quadratic trends observed in both experiments, however, indicated that recall in the 1-h delay conditions was greater than in either the 48-h delay or the immediate conditions. No substantial differences were observed between the 48-h delay conditions and the immediate conditions. The results are consistent with theoretical explanations of advance organizers focused on knowledge activation and integration (e.g., Ausubel, 1968; Derry, 1984; Mayer, 1984). That is, it seems reasonable to suggest that once an organizer has activated relevant reader knowledge and the reader expects to read a passage for which this knowledge will be helpful, such a "preparation" effect should last for as long as the reader can remember the organizer and/or which elements of knowledge it activated.

The results of the 1-h delay condition were a surprise. Across two experiments, the subjects in this condition recalled more of the text material than subjects in any other condition. These results suggest that a moderate delay between reading an advance organizer and reading organizer-relevant text may have a particularly beneficial effect on subjects' recall of text. If we presume that advance organizers operate by activating relevant schemata, then the results of the 1-h delay conditions are quite sensible. The subjects all knew that they were to return in 1 h for further activity, and we speculate that they rehearsed the organizer, extant knowledge relevant to the organizer, or a combination of the two during this time. Procedures designed to eliminate rehearsal presumably could be employed in future studies so that this hypothesis could be tested.

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Table 1
Results of Experiments 1 and 2

Condition	<i>M</i>	<i>SD</i>	<i>N</i>
Experiment 1			
Control	4.33	2.59	24
No delay	7.92	2.64	24
1-h delay	11.21	3.43	24
48-h delay	6.12	2.27	24
Experiment 2			
Control	4.53	2.26	15
No delay	7.93	1.44	15
1-h delay	10.67	2.26	15
48-h delay	7.13	1.60	15

Note—*M* = mean, *SD* = standard deviation, *N* = number. Means are in idea units recalled. In Experiment 1, 156 idea units were possible. Ninety-six were possible in Experiment 2.

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