

Usefulness of a Time-Line —with Historical Text¹

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HISTORICAL narratives in school text materials frequently are accompanied by a time-line. Especially is this the case when chronological relationships are deemed critical. On time-lines, events and their dates are arranged on a continuum which indicates visually to the reader the relative occurrence of events and differences in elapsed time between events.

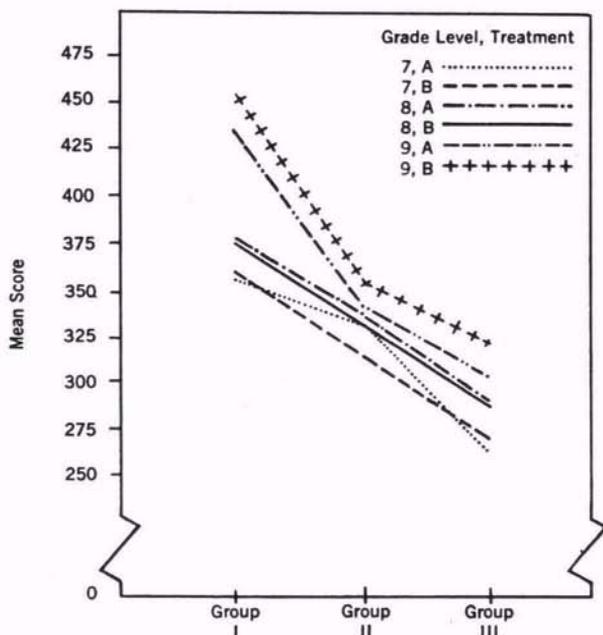
The usefulness of a time-line in promoting pupil learning has been advanced without a substantial research base. Indeed, research on the development of chronology (e.g., Mathews, 1926; Pistor, 1940; Friedman and Marti, 1945; and Arnsdorf, 1961) has included time-lines as both instruction and evaluation components, but has not investigated the specific function(s) of the time-lines as primary messages and/or reinforcers. Presenting information not available in an accompanying

textual passage, they operate as messages. Used as reinforcers, time-lines illustrate the message presented in the textual narrative when they abstract from the verbal material and display the message in a form different from the printed text. Time-lines in school texts are most commonly used as reinforcers.

Only one previous study (Davis, Hicks, and Bowers, 1966) has examined empirically the usefulness of a time-line with an historical text. It found that high school students did learn more from an historical narrative when accompanied by a time-line and that students having a relatively high IQ (< 120) profited more than did students having a lower IQ (> 109). The present study was designed in order to extend the inquiry thus initiated. This is one of a series investigating the usefulness of various graphic illustrations with social studies text and is the first to be reported.

Procedure: Five hundred and thirty-eight pupils enrolled in a junior high school of a suburban public school system served as subjects in this study.

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IQ LEVEL
Figure 1.

Pupils were assigned randomly to one of two experimental treatments. Intelligence test scores were available from school records. Accordingly, pupils were further grouped into one of three IQ levels. Group I included pupils whose IQ was 120 or above; group II included those with an IQ between 110-119; group III included pupils whose IQ was 109 or below.

A 1,150-word narrative, "India's Road to Independence," was written for this study and served as the common treatment component. The readability of this narrative, based on the Dale-Chall (1958) formula, was judged to be at the high 8th-low 9th grade level. In Treatment A, no time-line accompanied this textual narrative. In Treatment B,

this narrative was accompanied by a time-line which incorporated seven events. All events and dates on the time-line were also present in the narrative.

Multilithed booklets containing the prepared material were distributed to pupils in large study hall sections. The cover of each booklet was identical except for a number which, unknown to the subjects, indicated the experimental treatment in which they were included. A copy of the criterion test was the final element of the booklet.

Pupils were instructed to read and study the narrative. After 15 minutes of study time, pupils turned the narrative face down on their desks, and this material was collected by proctors. Fifteen

Source	df	Sum of Squares	Mean Square	F
Treatments	1	80.27	80.27	.13
IQ Levels	2	32134.44	16067.22	26.89**
Grade Levels	2	9195.73	4597.86	7.70**
Treatments x IQ Levels	2	101.67	50.84	.09
Treatments x Grade Levels	2	194.72	97.36	.16
IQ Levels x Grade Levels	4	2214.66	553.67	.93
Treatments x IQ Levels x Grade Levels	4	41504.76	10376.19	17.37**
Within	520	310684.40	597.47	

** Significant at .01 level.

Table 1. Analysis of Variance of Scores on Criterion Test of Chronological Relationships

minutes were allotted to answering the test questions, but almost all pupils completed them in 10 minutes. When test papers were collected, regular study hall routine resumed.

To test chronological relationships incorporated in the narrative, a 14-item multiple-choice criterion instrument was constructed. Its reliability was calculated to be .95.

Scores on the criterion were normalized and classified into a 2 (treatments) x 3 (grade levels) x 3 (IQ levels) design. Data were treated by analysis of variance (method of un-weighted means).

Results: The results of this analysis are presented in Table 1. There was no significant difference between treatments, the major interest of the study. A series of Scheffé tests revealed that

pupils at higher grade levels demonstrated, as might be expected, significantly greater achievement ($p < .01$) than those at lower levels (grade 9 > grade 8 > grade 7) and, too, that pupils with higher IQs achieved higher scores than did those with lower scores (group I > group II > group III). The significant triple interaction may be explained by the observation that pupils at higher grade levels and lower IQ levels in one treatment scored lower than pupils at lower grade levels and higher IQ levels in the other treatment (see Figure 1).

Discussion: These findings lend no support to the uncritical assumption of time-lines' usefulness with historical text, at least for junior high school pupils. While somewhat discrepant with the earlier study of the usefulness of time-lines (Davis, Hicks, and Bowers,

1966), these findings are consistent with the findings of some major related studies. For example, Burdick (1959) found no significant differences in comprehension of science information when a textual narrative was accompanied by drawings and when it was studied without illustration. Vernon (1952, 1953) reported similar results in studies of graphs with text.

Apparently, at least in this study, pupils did not significantly use the time-line as they read and studied the historical narrative. Such a possibility, by itself, does not invalidate the use of time-lines in instruction in history. Perhaps, pupils did not know how to use a time-line, even though instruction in this skill generally is advocated before junior high school. The findings do suggest that time-lines' appearance in text materials is not sufficient to facilitate pupil learning of chronological relationships. In this situation, verbal descriptors (words) may need no visual device. The visual (time-line) may be redundant and may serve to restrict rather than expand learning. On this point, more evidence than that now available is clearly needed.

If the device of the time-line can be useful, other questions surely must be posed: Do pupils learn how to use time-lines encountered with textual narrative? How do pupils and teachers actually use a time-line with text? Is the number of elements in a time-line related to its usefulness? Is a time-line more effective when it displays relationships of longer or shorter periods of time? Does instruction in the use of graphic illustrations (specifically, a time-line) with text increase pupils' performance?

Without doubt, this study merits replication. If subsequent studies confirm its findings, revision of some practices in the social studies—in text production, teacher preparation, and school instruction—obviously will be needed. Complacency about the general effectiveness of various components in text materials surely is not warranted.

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