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AUTHOR        Tuckman, Bruce W.
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ABSTRACT
              The coded elaborative outline (CEO) was evaluated as
a strategy for helping students learn from text. CEOs are outlines of
main points that include the coding of information read and elaborate
on that information to enhance meaning. The following five conditions
were compared: (1) required CEOs; (2) voluntary CEOs; (3) CEO
instruction only; (4) required standard outlines; and (5) no
outlines. Five college classes, with 182 undergraduates who were
equivalent in verbal comprehension and grade motivation, were each
randomly assigned to 1 of the 5 conditions as part of an
undergraduate educational psychology course and subsequently tested
on a valid and reliable achievement test. Results show that students
who were required to write CEOs for the textbook chapters covered on
the test scored significantly higher than did students in all of the
other conditions. CEOs would appear to be an effective strategy to
help students learn from text. Three tables present study findings,
and one figure illustrates the discussion. (SLD)

The Coded Elaborative Outline as a Strategy to Help Students Learn From Text

Bruce W. Tuckman*

Florida State University

*Professor, Department of Educational Research, B-197, Florida State University,

Tallahassee, FL 32306

2

## ABSTRACT

This study was aimed at evaluating the coded elaborative outline (CEO) as a strategy for

helping students learn from text. CEO's are outlines of main points that include both the

coding of information read as well as elaborating on that information to enhance meaning.

Five conditions were compared: (1) CEO's required, (2) CEO's voluntary, (3) CEO

instruction only, (4) standard outlines required, (5) no outlines. Five college classes,

equivalent in verbal comprehension and grade motivation were each randomly assigned

to one of the five conditions as part of an undergraduate educational psychology course

and subsequently tested on a valid and reliable achievement test. Results showed that

students who were required to write and submit CEO's for the textbook chapters covered

on the test scored significantly higher than students in all of the other conditions. CEO's

would appear to be an effective strategy to help students learn from text.

While much of the learning done by college students is from textbooks, little work has been done on how this learning can be improved. Most of the research on learning from text has been done with high school students. It has shown that learning strategies such as elaboration, defined by E. Gagne et al. (1984) as learner-generated information, such as an inference, image, example or analogy, helps students retain and recall information from memory (Weinstein, 1982; Weinstein & Mayer, 1985; E. Gagne et al., 1984). Elaboration is thought to work by creating a rich memory structure through context and associations, and much of what causes comprehension to improve is believed to be based on elaboration (Anderson & Reder, 1979). Elaboration also may add "richness" by allowing learners to personalize their associations to new information.

The value of schematizing or coding information from text into categories has been shown by Meyer, Brandt, and Bluth (1980) and by Cook (1982; also Cook & Mayer, 1983). In both studies, students classified textual information into pre-learned categories (e.g., covariance, comparison, collection, description, response) which appeared to help them identify the main point, to store it in memory, and to retrieve it when needed. Despite these demonstrations of the value of coding for classifying, comprehending, and recalling text, there has been little tendency to teach it as a study skill.

The idea of an outline as a learning strategy is based on the value of selecting from text the most critical information as an aid to understanding it (Mayer, 1984), and of the outline form as a way of organizing information to facilitate its study and retrieval (Glynn & DiVesta, 1977). Hence, outlining is a strategy for selecting and organizing the main points contained within a body of text, coding is a strategy for storing and retrieving the information in the outline based on its function or use, and elaborating is a strategy for

creating personalized associations to that information in order to more easily recall it.

The purpose of this study was to evaluate the effectiveness of a strategy to help students learn from text, called the *coded elaborative outline* (CEO). The CEO is an outline of textbook chapters that students make that includes, in addition to the *organized sequence of main points* typically found in an outline, a *coding* of main points using a six code scheme, and *elaborations* of main points in the form of examples, explanations, analogies, metaphors, or other personal images. CEO's done by requirement were compared to CEO's done (or not done) voluntarily for grade bonuses, typical outlines done by requirement, CEO's taught about but not required, and no exposure to CEO's.

Taken together, the strategies embodied in the coded elaborative outline can be incorporated into the model of text processing shown in Figure 1. In this model, the student first sreens the text to find signals that serve as cues to the main points, then codes these into categories, organizes them into an outline format, recaps them into brief, rehearsable statements, and finally elaborates on them to enhance their meaning. Carrying out these steps as aids to text processing was expected to facilitate text learning in a college course.

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Insert Figure 1 about here

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## METHOD

Subjects. Ss were 182 undergraduate college students enrolled in a required Educational Psychology course during a 13-week summer term. The course was divided up into three segments on learning theory, instructional design, and testing respectively, with only the first segment of five weeks (on learning theory) involved in the study. Five

classes of approximately equal size and student composition, all taught the same content

by the same instructor, using the same textbook (written by the instructor), were used.

Classes were assigned randomly to conditions.

Treatments. In the first condition, required CEO, all students were required to prepare

and turn in for evaluation CEO's of six of the seven textbook chapters covered in the

instructional segment.  They were given a CEO of the seventh chapter to use as a model,

along with instruction on how to prepare a CEO, at the beginning of the segment.  The

coding categories to be used were developed by the author and are shown below.

(a) Definition/Description: telling what a concept means or looks like (e.g.,

"Short-term memory is the place that incoming information is temporarily stored after it

passes through the sensory register").

(b) Antecedent/Consequent: telling what caused a concept (e.g.,its prerequisites) or

what its affects (e.g., its uses) are (e.g., "Meaningfulness causes short-term memory to be

enhanced; short-term memory can be used to prepare for exams").

(c) Comparison/Contrast: telling what other concept a concept is like or is better or

worse than (e.g., "Long-term memory has greater capacity than short-term memory").

(d) Sequence/Subdivision: telling where a concept fits in order among other

concepts or what its subcategories are (e.g.,"There are two kinds of memory, short-term

and long-term").

(e) Evidence/Example: telling of findings that relate to a concept or giving a concrete

instance of it (e.g., "An example of primacy is remembering the name of the first person to

whom you are introduced").

(f) Problem/Solution: telling what is wrong with something and how it can be fixed

(e.g., "When your problem is having trouble remembering what you have studied, try taking

a break").

Students were encouraged to use imaginative elaborations such as "a doctor's waiting room" for short-term memory and "the closets in your house" for long-term memory, but they were also permitted to use elaborations in the form of examples and descriptions as long as they were different from those given in class or in the textbook. Elaborations were not required for all entries, only for major ones.

The outline format to be used was the typically organized hierarchical one using major headings and two or three levels of minor heading with the structure: I. A. 1. a. For each entry in the outline, a brief summary statement was required along with a designation of its coding using the designations DD, AC, CC, SS, EE, PS.

CEO's were handed in each week on the chapters covered the preceding week, and were immediately graded and returned. Grading categories were outstanding (A) good (B), and poor (C). CEO grades counted for one-third of the segment grades. This condition represented the experimental treatment.

In the second condition, voluntary CEO, all circumstances were the same as in the preceding condition, except that CEO's were not required. However, those students who turned in CEO's for all the chapters were told they would receive a double-grade bonus for the segment (e.g., a B would become an A-) while those turning in CEO's for half the chapters would receive a single- grade bonus (e.g., a B would become a B+). This condition provided a basis for evaluating the role of self-motivation in conjunction with the CEO.

In the third condition, CEO instruction, students were taught how to write CEO's and given a sample exactly as in the preceding two conditions but were neither required to write CEO's nor offered any bonuses or other inducement for writing them (other than the

evidence of their effectiveness presented in the lecture). This condition served as a control

for knowing about CEO's.

In the fourth condition, required outline, students were required to write outlines for

six of the seven chapters as in the first condition, but were not taught anything about

outline writing. They were simply told to write the kind of outlines of the main points they

were used to writing and to keep them neat and legible. Outlines were graded on a

Pass/Fail basis. This condition served as a control for having a course requirement that

necessitated extra work.

In the fifth condition, no outline, students were neither taught about CEO's nor asked

to write them (nor were they asked or required to write any kind of outline at all). They

were taught about abstracting, elaborating, and schematizing as part of the course content

but the concepts were never combined or offered as a technique for their use. This

condition served as a control for all aspects of the treatment combined.

The five treatment conditions are summarized in Table 1.

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Insert Table 1 about here

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Dependent Variable. The dependent variable was achievement of the content

covered by the lectures and textbook chapters included in the learning theory segment. It

was measured by performance on a 100-item multiple choice achievement test that

reflected the objectives of the chapters, and for which a K-R 21 reliability coefficient of .87

was obtained. The majority of the test items measured comprehension rather than mere

recall. The scores on this test were the basis for all or part of the grade (depending on the

condition) for this segment of the course. Thus, if succe. sful as a learning strategy, the

CEO would enable students to earn higher grades in the course segment by doing better on the exam. However, it was the exam score, not the grade, that served as the dependent variable, since the grade was not independent of the treatment conditions.

Control Variables. At the start of the segment, students completed a 36-item vocabulary test from the Kit of Reference Tests for Cognitive Factors (French et al., 1963) as a measure of verbal comprehension related to test performance. Scores on the achievement test used in this study correlated 0.46 with scores on this vocabulary test. Students also completed a questionnaire about their grade expectations (i.e., what grade they expected to get) and the importance to them of obtaining a high grade. No significant differences were found between the five classes on any of the three premeasures (F= 0.370, 0.474, 0.460; df=4, 176, respectively) indicating that the classes were intitially equivalent and that the design could be considered quasi- experimental. For further safeguarding, results on the dependent measure were analyzed using an analysis of covariance with scores on the vocabulary test as a covariate.

## RESULTS

Results on the analysis of covariance of achievement test scores by treatment condition with vocabulary test scores as the covariate are shown in Table 2. An F-ratio of 4.288 (df=4, 176) was obtained which is significant at the .002 level. Means and standard deviations for the five treatment conditions are shown in Table 3. Ss in the required CEO condition had a mean score on the exam of 76.1, compared to 71.5 for the voluntary CEO, 69.9 for the CEO instruction, 69.1 for the required outline, and 66.9 for the no outline (control) condition. Highest scores were obtained by students required to prepare CEO's, reflecting the ability of CEO's to enhance test performance.

Post hoc comparisons of ordered means was done using the Newman-Keuls method

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Insert Tables 2 and 3 about here

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for unequal sample sizes (Winer, 1971). Results of this analysis showed that the mean for the required CEO condition significantly exceeded the means for all other conditions, and that none of the other conditions differed significantly from one another. These results are also indicated in Table 3.

## DISCUSSION

Writing coded elaborative outlines for textbook chapters whose content formed the basis for the course exam was shown to significantly enhance performance on that exam relative to other approaches to studying (e.g., writing typical outlines or simply reading and highlighting which the comparison groups more than likely did). At the time of the exam, students in the two non-outline groups were asked to indicate whether they had outlined any of the chapters during the semester or prior to the exam and no student indicated having outlined a single one. This indicates that outlining as a study strategy is not likely to occur unless either required or induced by offering a grade bonus. The likelihood of students preparing outlines that incorporate coding and elaboration of content is even smaller unless this approach is taught and student s are required to use it.

Preparing a particular type of outline, a CEO, turned out to be a highly successful study strategy for students who used it as reflected by significantly higher exam scores and, therefore, higher grades. Required outline writing insured that students would both interact with and process the textbook on a timely basis. However, mere outlining itself did not account for the superior reesults. Rather, it was the combination of outlining, coding,

and elaborating as called for in the text processing model described in this paper, that led to better test results. It would appear that by writing this type of outline, students were more likely to both understand and recall information covered in the text and on the test.

There is also the issue of whether or not such outlines should be written on a voluntary basis. When the voluntary CEO group is divided into those who wrote outlines for all chapters, those who wrote outlines for half, and those who wrote outlines for none, the means on the achievement test for the three groups respectively are 74.9 (almost the same as the required CEO group), 72.4, and 68.3 (almost the same as the last three groups). Thus, the CEO's have value regardless of whether they are required or voluntary. However, the value of CEO's only accrues for those who write them and, since in the voluntary condition almost half of the students wrote none at all, it is far more effective to require the CEO's than to attempt to induce students to write them voluntarily.

It is often difficult to totally separate the effect of study time from the effect of study strategy, since some strategies require more time than others. To compensate for this difficulty, the required outline condition was included. Informal discussions with students suggested that, at first, CEO students spent more time than the others, but that, thereafter, the amount of time spent was approximately the same. Of the two outline formats, however, the CEO was clearly the more effective in terms of exam performance.

Instructors are encouraged to require the strategy of writing of coded elaborative outlines of textbook chapters in their courses. It is a way of not only guaranteeing that students will read the textbook in a timely and consistent manner, but of assuring that they will process it in order to schematize the information that it contains. Such processing can be expected to lead to better recall and understanding.

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Table 1

A Summary of the Treatment Conditions Regarding CEO's

| Condition | Instructional Exposure | Performance Requirements |
|---|---|---|
| CEO Required | Taught about CEO's | Must Submit CEO's |
| CEO Voluntary | Taught about CEO's | Could Submit CEO's for Bonus |
| CEO Instruction | Taught about CEO's | None |
| Outline Required | None | Must Submit Standard Outlines |
| No Outline | None | None |

Table 2

Results of the ANCOVA of Achievement Test Scores by Treatment

Condition With Vocabulary Test Scores as the Covariate

| Source | Sum of Squares | DF | Mean Square | F | P |
|---|---|---|---|---|---|
| Treatment | 1434.208 | 4 | 358.552 | 4.288 | 0.002 |
| Vocab | 4747.019 | 1 | 4747.019 | 56.773 | 0.000 |
| Error | 14716.157 | 176 | 83.615 | | |

Table 3

Means (X) and Standard Deviations (SD) on the Achievement Test Score

for Students in Each of the Five Treatment Conditions

| | CEO Req'd | CEO Volun | CEO Instr | Outline Req'd | No Outline |
|---|---|---|---|---|---|
| X | 76.1[ab] | 71.5 | 69.5 | 69.1 | 66.9 |
| SD | 10.1 | 8.7 | 10.3 | 10.3 | 12.6 |
| N | 38 | 40 | 28 | 38 | 38 |

[a] Significantly different from next highest mean, $p < .05$
[b] Significantly different from remaining means, $p < .01$

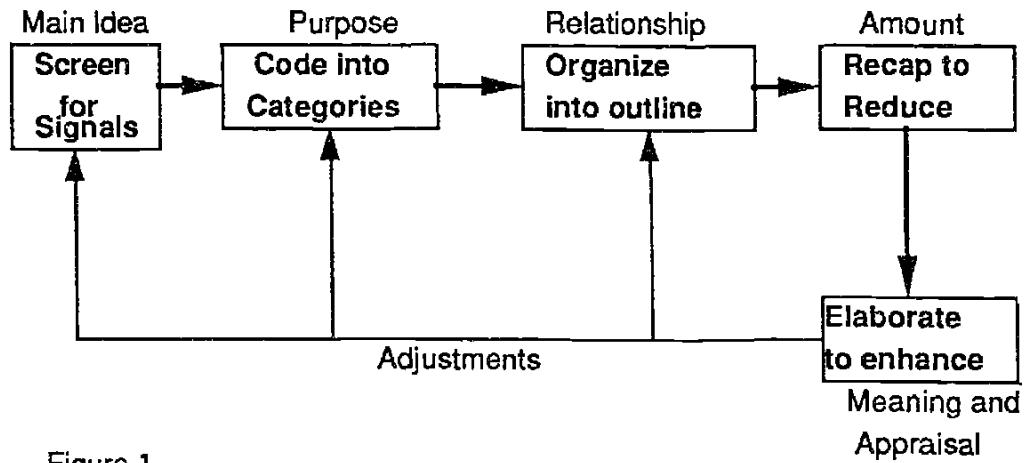| Main Idea | Purpose | Relationship | Amount |
|-----------|---------|--------------|--------|
| **Screen for Signals** | **Code into Categories** | **Organize into outline** | **Recap to Reduce** |

Adjustments

**Elaborate to enhance**

Meaning and Appraisal

Figure 1.

**OVERVIEW OF HOW TO STUDY A TEXTBOOK (or  CE O. )**