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ABSTRACT

Fifty-two college students, enrolled in an introductory psychology course, served as subjects for this study, the purposes of which were: (1) to determine whether supplying subjects with a list of behavioral objectives causes them to focus their learning efforts on the specified behaviors to the extent that attention to non-specified behaviors is reduced; and (2) to determine whether supplying subjects with training which stresses the nature of behaviorally-stated objectives enables more effectively. The entire experimental procedure, including materials used, is clearly elaborated. As hypothesized, the findings indicate that possession of objectives leads to higher performance on objectives-related test items than on non-objectives-related items. In addition, Ss given objectives were able to recall information not mentioned by objectives at least as well as Ss not given objectives. Finally, no support was given to the hypothesis that training in the nature of objectives enhances subsequent performance the learning task. (TL)

EFFECTS ON ACHIEVEMENT OF POSSESSION OF BEHAVIORAL OBJECTIVES AND TRAINING CONCERNING THEIR USE

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Proponents of the mastery learning model for education have stressed the value of communicating behavioral objectives to students as a means of improving the efficiency of the learning process [Bloom (1968), Block (1971), Mayo (1970)]. One prediction which appears to be consonant with the model is that students will learn behaviors specified in communicated objectives better than they will learn behaviors not specified in advance. Advocates of the use of objectives appear to hold the implicit assumption that students will view material relating to the objectives as relevant and to-be-learned, and will therefore focus upon that material.

However, measurement concerning objectives thus far has tended to be restricted to specif[illegible]s (except, of course, in cases in which specified behaviors are inadvertantly measured by tests inappropriate to the objectives). A research design appropriate for examining learning of relevant and nonrelevant material was used by Postman and Senders (1946), but was designed to measure the effects of instructional set, not objectives.

If it were to be shown that possession of behavioral objectives tends to cause students to focus their learning efforts on the specified behaviors to the extent that attention to non-specified behaviors is reduced, this finding would be of practical importance to educators. For, if the effects of specifying behavior in advance are significant and predictable, it becomes essential (1) to be certain that all essential behaviors are specified to the students, and (2) to be equally certain that achievement is measured

by items which do in fact measure the objectives.

The possibility that students may need to learn how to use objectives has been suggested by Boardman (1970), Yelon and Schmidt (1971), and Jenkins and Deno (1971). It is possible that the student who is handed a set of behaviorally stated objectives for the first time might not necessarily be able to proceed effectively with his learning task. The student who is naive with reference to objectives may need to go through a sort of "psyching out" process before he really understands how to use objectives in his study. In addition to examining the effects of communicated objectives on learning of specified and non-specified behaviors, this study will examine whether a training program emphasizing knowledge about the nature of behaviorally-stated objectives (and their relationship to measurement items) can aid students to utilize objectives more effectively. A closely related question to receive attention is whether such training leads to positive attitudes toward the use of objectives.

If it were to be shown that training is helpful, educators might profitably consider using such a program at the beginning of courses in which objectives will be provided to students. Such a program might eliminate the need for the expending of student energies for "psyching out" what is to be done with objectives. If the training program were also to bring about the development of positive attitudes toward objectives, this would represent one more argument for its adoption.

The present study was designed to determine whether (1) supplying subjects with training stressing the nature of behaviorally-stated objectives enables them to utilize objectives more effectively for a subsequent learning task and leads to positive attitudes toward the use of objectives, and (2) whether supplying subjects with a list of objectives causes the subjects to focus their learning efforts on the specified behaviors to the extent

that attention to non-specified behaviors is reduced. The hypotheses for this study were:

1. Subjects receiving the most complete training concerning objectives will exhibit highest scores on a training test over behavioral objectives.
2. Subjects receiving the most complete training concerning objectives will exhibit the most favorable attitudes toward the use of objectives.
3. Subjects who receive the most complete training and who are provided with a partial list of objectives (List "A") will obtain higher scores on criterion test items measuring List "A" objectives than will other subjects.
4. Subjects who receive a partial list of objectives (List "A") will score higher on criterion test items measuring List "A" objectives than on test items measuring objectives not communicated to them (i.e., List "B" objectives).
5. Subjects who receive no objectives will not differ in achievement on the two subsets of criterion test items.

Method

Subjects

The subjects were 52 sophomores, juniors and seniors enrolled in a class of introductory educational psychology taught by the junior author at the University of Georgia. The subjects were randomly assigned to one of six experimental groups.

Materials

a. Training materials: Mager's (1962) Preparing Instructional Objectives was used in the training condition. Practice materials (stressing evaluating

whether an objective is stated behaviorally, the appropriateness of test items for given objectives, and recognizing components of well-stated objectives) were also prepared.

b. Training test: A 30-item measure, based on concepts discussed in the Mager text, was used to test the immediate cognitive effects of the training treatment. This instrument consisted of 20 true-false items concerning (1) whether given objectives are stated behaviorally, and (2) the appropriateness of given test items. Ten additional items called for correct underlining of performance criteria contained in given objectives.

c. Attitude inventory: A self-report measure, in which subjects could indicate their interest in and feelings about objectives, was developed. This instrument contained 6 items which were 5-point, Likert-type scalar measures, plus a series of positive and negative words concerning objectives. The maximum possible score on this instrument is 34.

d. Learning task: Bloom's (1968) article, "Learning for Mastery", was used as the learning task. This paper was selected because of (1) its relevance to the content of the course, and (2) whereas it forms a coherent whole in terms of discussing the mastery model, at the same time it contains a number of relatively discrete ideas, points of view, and research findings which are, to some extent, isolable from each other. Since the authors wished to communicate only one-half of a total list of objectives to some subjects, it was necessary to use a learning task which contained ideas and findings with at least some degree of independence from each other.

e. Objectives: Six major objectives, each calling for retention of factual knowledge, were developed from the learning task. The objectives were then divided into two lists of three objectives each. The two lists were matched for easily visible/embedded material, and were also matched

as to location of the material relating to the objectives (each list contained one objective relating to material near the beginning, middle, and end of the article). One list (List "A") was then selected to be presented to subjects during the treatment calling for possession of objectives. The second list (List "B") was not presented to any subjects.

f. Criterion test: A 40-item, matching-type instrument was developed to measure the two lists of objectives described above. List "A" objectives were measured by 20 test items; List "B" objectives were measured by 20 additional test items. Based on the administration of the criterion test to subjects in the present study, an estimate of reliability of .81 was obtained (Kuder-Richardson Formula 20).

Procedure

Subjects were college juniors and seniors enrolled in an introductory educational psychology course. Since the task materials were relevant materials for the course and since the E was the teacher, no distinction between instructional and experimental activities was necessary. Every effort was made to make the group assignments and task assignments a part of the normal activities of the course. Subjects were informed that, as a customary instructional procedure, the class would be divided into small groups. Six experimental groups were formed by random assignment. Schedules indicating meeting times and assignments were given to each group. Further, subjects were infromed that while each of the groups would initially have different assignments, students would be responsible only for the activities of their particular group. According to Arygris (1968) educational and psychological researchers are just beginning to realize the significance of the relationship between E and S. Since the results of this study would

be generalized to classroom instruction, the relationship between E and S was established and maintained, even after the study was over, as that of teacher and learner.

Treatment I: Training

Groups I and IV read Mager's Preparing Instructional Objectives, and received approximately 100 minutes of classroom instruction and practice on the training materials related to this text. Instruction centered on the three instructional objectives in the Mager book. Materials were prepared for each objective similar to the tasks used in the Mager book. Transparancies and handouts were used for classroom discussions. A short formative [illegible]as administered for each objective. The major training effect, if indeed there was to be one, was the practical experience of using objectives during learning. A major thought in developing the short training procedure was that the procedure should be realistic within the usual context of a college course. The question raised by this treatment is "Will a relatively short training experience with instructional objectives, suitable for college instruction, immediately influence a subsequent learning task involving the use of instructional objectives?".

Group II and V read the same book outside class, but received no classroom instruction or further practice. Groups III and VI receive no training, and were asked to read and critique an article on student unrest.

At the next class meeting, an attitude inventory was administered (on an anonymous basis) to measure attitudes toward behavioral objectives and their use. A 30 item training test, based on the objectives in Mager's text was administered to measure the immediate cognitive effects of the training.

Treatment II: Possession of List "A" Objectives

All groups were assigned to read Bloom's (1968) "Learning for Mastery" outside class, and were told to prepare for a test. Without the knowledge of Groups IV, V, and VI, List "A" objectives were supplied to Groups I, II, and III. These latter groups were told to use these objectives in preparing for the test. No instruction was given to any group.

At the next class meeting, the criterion test was administered. Groups I, II, and III were tested separately from Groups IV, V, and VI.

A summary of the design appears in Figure 1. Fifty-one subjects completed the training test and attitude inventory; fifty subjects completed the criterion test. For criterion test analyses involving two-way analyses of variance, one subject from each of two cells were randomly selected to be dropped in order to equalize N's across cells.

Results

Training test: A one-way analysis of variance was conducted over the results of the test measuring knowledge about objectives. The mean scores for the three levels of training differed reliably ($F = 40.5$, d.f. = 1, 47; $p < .001$). Cell summary data and table for the one-way analysis of variance appear in Table 1. Following the analysis of variance, the mean for Groups I - IV was contrasted with pooled means for Group II - V and III - VI to see whether the addition of class instruction led to significantly better test achievement when added to the reading of the Mager text. This selected contrast was carried out in order to test the first hypothesis. A D' contrast (Scheffe method, as described by McNemar, pp. 285-86) was used. Acceptin alpha as .05 ($K = 2.526$), 2,48 d.f., D' for this contrast was 7.24. As hypothesized, subjects who received the most complete training achieved highest scores on the training test.

FIGURE ONE

Design of the Study

Treatment 2: Possession of Partial Set of Objectives (List "A")	Treatment 1: Training in Knowledge about Behavioral Objectives		
	Mager book + instruction	Mager book, no instruction	No training
Objectives	Group I	Group II	Group III
No objectives	Group IV	Group V	Group VI

Attitudes: A one-way analysis of variance conducted across the three levels of training indicated that training level was significantly related to attitude ($F = 17.71$, d.f. = 1,47, $p < .001$). Table 2 contains the cell summaries and results of the one-way analysis of variance. When the mean score for Groups I - IV was contrasted with combined means of the other groups for a D' contrast, D' for this comparison was 4.27 (significant at .05 level). When subjects who received the most complete training were compared to all other subjects, results indicated that, as hypothesized, complete training produced the most favorable attitudes.

Criterion test scores: Three by two analyses of variance were conducted to test the significance of main effects (Level of Training, and Possession of List "A" Objectives), and their interaction. Analyses were conducted separately for test items measuring List "A" objectives, for items measuring List "B" objectives, and for total test scores.

a. Cell summary data and results of the two-way analysis of variance appear in Table 3. Test items measuring List "A" objectives: A significant Row effect emerged: Possession of List "A" objectives, $F = 5.28$, d.f. = 2,46, $p < .05$. However, there were no significant effects for Column (Training: $F = .35$, d.f. = 2,46), or for interaction ($F = .40$, d.f. = 2,46). Subjects who possessed List "A" objectives passed significantly more items which measured those objectives than did subjects who received no objectives. However, the training treatment did not enhance achievement. (In fact, subjects with objectives but who received no training obtained the highest scores of all groups.) Hypothesis #3 was, therefore not supported.

b. A summary of the cell means and the two-way analysis of variance table appears in Table 4. Test items measuring List "B" objectives: There were no significant differences in performance on these test items for which no subjects received objectives. In fact, means were

remarkably similar across groups.

c. Total test scores: Table 5 contains the cell summary data and the results of the two-way analysis of variance. Total scores on the criterion test did not differ significantly. There was no significant effect upon total test achievement attributable to Training, Possession of Objectives, or Interaction.

d. Comparative performances on subparts of the criterion test: (1) Subjects who possessed List "A" objectives: the mean score on test items measuring List "A" objectives for these subjects was 14.04; for test items measuring List "B" objectives, the mean score was 13.0. Using a t-test for correlated means (one-tailed), t=1.73, significant at .05 level, d.f.=23. As hypothesized, subjects who possessed objectives passed significantly more test items which related to the objectives than items which did not.

(2) Subjects who possessed no objectives: performance on test items measuring List "A" objectives averaged 11.80 for subjects who possessed no objectives. On test items measuring List "B" objectives, their mean score was 12.40. The t-test for correlated means (two-tailed) yielded t=1.11, d.f.=23. As hypothesized, subjects who received no objectives did not differ significantly in performance on the two subparts of the criterion test. In short, the two subparts do not differ significantly in terms of difficulty.[1]

Discussion

As hypothesized, the findings of this study indicate that possession of objectives led to higher performance on objectives-related test items than on non-objectives-related items. These results are viewed by the authors as

[1] This result could be further strengthened by showing no transfer effects from List "A" to List "B" on an independent group of subjects.

consonant with the mastery learning model. It is likely that one of the chief benefits which students derive from using behavioral objectives is that objectives enable them to organize and retain essential points of a large body of learning material. The degree of facilitative effect objectives provide for students is probably directly related to the quantity of learning material with which the student must deal. Since the learning task in this study was relatively short, this experimental design probably represents a conservative test of the effects of specifying desired behavior.

While a major effect of using instructional objectives is to increase test scores over the objective related material, objectives do not constrict Ss' recall of additional concepts from the same material; that is, Ss given objectives could recall information not mentioned by objectives at least as well as Ss not given objectives. Hence, we do not find in this study any tendency for the Ss who were given objectives to attend only to the information related to the objectives.

Proponents of the model of learning for mastery [Bloom (1968), Block (1971), Mayo (1970)] have emphasized the value of providing objectives to students as an important part of the mastery learning program. Attention (in terms of both theory and research) has given to the question of whether students who are provided with objectives will exhibit higher achievement than students who receive no objectives. The findings of the present study tend to affirm that objectives lead to enhanced achievement, and support classroom research results such as those of Dalis (1970), and Nelson (1971). The findings do not agree with those of Yelon and Schmidt (1971), although the learning task used in their study was more complex and of short duration (20 minutes). The present findings also disagree with thos of Jordan (1971) (who used a standardized test to measure the effects of objectives), and Boardman (1970) (who indicated that there was evidence some students needed to be instructed in the use of objectives).

This study is perhaps illustrative of a typical college assignment. The professor says "I would like for you to read this article and we'll have a short quiz on it next time. It's an important article and we'll discuss it fully after the quiz." Focusing on the recall of information, the results reported here indicate that if the professor also gives a few instructional objectives to direct the student, the students will, on the average, score about 15% higher on a recall test with no "loss" of additional information in the article.

In this study, total scores on the criterion test were not significantly higher for subjects who received List "A" objectives -- nor would they necessarily be expected to be, as half the test consisted of items for which they had received no objectives. The pattern of scores indicates that had the test consisted solely of items related to the objectives List "A", subjects who received objectives would have scored significantly higher. This points up another area of practical importance to educators who do provide their students with behavioral objectives: achievement should be measured by test items which measure the objectives. When tests evaluate behaviors other than those which are represented in the course objectives, achievement may appear to be negatively affected by the presence of objectives.

Several researchers have suggested that students may need to learn how to utilize objectives. In the present study, a training program designed to provide knowledge about objectives was supplied to some subjects. The authors believed that this type of training, with its stress on the nature of well-stated objectives and their relationship to appropriate test items, might enable subjects to draw inferences about how to use objectives. However, this training did not enhance subsequent performance on a criterion test based on a learning task for which objectives were supplied. This was despite

the fact that training test scores were significantly higher for subjects who received the highest level of training, as were attitudes toward objectives. (It is well to note, however, that the amount of time spent with the experimenter varied across training levels. It is possible that the higher affective scores exhibited by Groups I & IV may have been at least a partial function of the greater amount of time spent with the experimenter.)

It is possible, of course, that training is not needed to utilize the objectives related to the learning task used in this study. However, it may be that rather than emphasizing knowledge about objectives, a training program more specifically concerned with providing practice and strategies for using objectives would be more helpful. Believing this to be the case, the authors of the present study have undertaken to design and execute such a training program (Morse and Tillman, in preparation).

The question of whether or not instructional objectives facilitate learning does not deserve simply a yes or no answer. We must ask instead "Under what instructional conditions do objectives facilitate learning and under what instructional conditions do we find no facilitation of learning?". Studies involving interactions of instructional conditions with the use of objectives will provide a basis for developing an effective strategy for using objectives.

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Table I

SCORES ON TRAINING TEST OVER KNOWLEDGE ABOUT OBJECTIVES

Cell summary:

Mager text + instruction	Mager text only	No training
I & IV	II & V	III & VI
$\bar{X}$=25.06	$\bar{X}$=21.66	$\bar{X}$=13.41
N = 16	N = 18	N = 17

Total N = 51

Grand Mean = 20.04, std. dev. = 6.12

One-way analysis of variance on scores from training test:

Source	d.f.	S.S.	M.S.	F
Between	2	1203.58	601.79	40.5***
Within	48	709.40	14.79	
Total		1912.98		

***p < .001

Table 2.

SCORES ON ATTITUDE INVENTORY

Cell summary:

	Mager text + instruction	Mager text only	No training
Total N = 51 Grand Mean= 26.84, std. dev. = 4.45	I & IV $\bar{X}$=29.87 N=16	II & V $\bar{X}$=27.77 N=18	III & VI $\bar{X}$=22.88 N=17

One-way analysis of variance on scores from attitude inventory:

Source	d.f.	S.S.	M.S.	F
Between	2	428.76	214.38	17.71***
Within	48	581.24	12.11	
Total		1010.00		

***$p < .001$

Table 3.

PERFORMANCE ON CRITERION TEST ITEMS

MEASURING LIST "A" OBJECTIVES

Cell summary:

	Mager text + instruction	Mager text only	No training
Received List "A" Objectives	I $\bar{X}$=13.5 N=8	II $\bar{X}$=13.5 N=8	III $\bar{X}$=15.13 N=8
Received no Objectives	IV $\bar{X}$=11.38 N=8	V $\bar{X}$=12.25 N=8	VI $\bar{X}$=11.75 N=8

Total N=48
Grand Mean=12.92

Two-way analysis of variance on scores on test items measuring List "A":

Source	d.f.	S.S.	M.S.	F
Row (Objectives "A")	1	60.78	60.78	5.28*
Col. (Training)	2	8.06	4.03	.35
Interaction	2	9.11	4.59	.40
Error	42	483.75	11.52	
Total	47	561.70		

*$p < .05$

Table 4.

PERFORMANCE ON CRITERION TEST ITEMS

MEASURING LIST "B" OBJECTIVES

Cell summary:

	Mager text + instruction	Mager text only	No training
Received List "A" Objectives	I $\bar{X}$=13 N=8	II $\bar{X}$=13 N=8	III $\bar{X}$=13 N=8
Received no Objectives	IV $\bar{X}$=12.4 N=8	V $\bar{X}$=12.1 N=8	VI $\bar{X}$=12.7 N=8

Total N=48
Grand Mean=12.7

Two=way analysis of variance on scores on test items measuring List "B":

Source	d.f.	S.S.	M.S.	F
Row (Objectives "A")	1	4.09	4.09	.36
Col. (Training)	2	.80	.40	.04
Interaction	2	.78	.39	.03
Error	42	472.25	11.24	
Total	47	477.92		

Table 5.

PERFORMANCE ON TOTAL CRITERION TEST

Cell summary:

	Mager text + instruction	Mager text only	No training
Received List "A" Objectives	I $\bar{X}$=26.5 N=8	II $\bar{X}$=26.5 N=8	III $\bar{X}$=28.1 N=8
Received no Objectives	IV $\bar{X}$=23.8 N=8	V $\bar{X}$=24.4 N=8	VI $\bar{X}$=24.5 N=8

Total N=48

Grand Mean=25.6

Two-way analysis of variance on scores on total criterion test:

Scource	d.f.	S.S.	M.S.	F
Row (Objectives "A")	1	96.33	96.33	2.64
Col. (Training)	2	12.13	6.07	.16
Interaction	2	4.54	2.27	.06
Error	42	1568.25	36.47	
Total	47	1681.25		