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ENHANCING UNDERGRADUATE ACHIEVEMENT IN EDUCATIONAL PSYCHOLOGY WITH INSTRUCTIONAL OBJECTIVES

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Two quasi-experiments were conducted to assess the effects of exposure to instructional objectives on the achievement of undergraduates enrolled in an educational psychology course. Students enrolled in morning and afternoon classes during the spring semester were exposed to instructional objectives highlighting course content and identifying material deemed important for the midterm and final examinations. The students enrolled in morning and afternoon classes during the fall semester did not receive objectives. Among afternoon students, multiple regression analyses indicated that exposure to objectives significantly improved performance, by at least seven points, on the midterm and final controlling for age and prior achievement. Evidence was adduced which suggests that among the afternoon students the size of the effect on performance on the final was an underestimate. Among morning students no significant effects for objectives were found. It was argued that objectives are not a substitute for effective instruction but may be considered a useful adjunct in college teaching.

Research on the effects of exposure to instructional objectives has often involved learners who are tested for goal-relevant and -irrelevant knowledge acquired in reading texts (e.g., Barker and Hapkiewicz, 1979; Duchastel and Brown, 1979; Gagne and Rothkopf, 1975; Kaplan and Rothkopf, 1974). Klauer (1984) in a meta-analysis of research in this field suggested that objectives probably enhance goal-relevant learning but may reduce goal-irrelevant learning. Klauer (1984) found that instructional objectives of the kind described by Mager (1962) exerted smaller effects than more general types of instructional objectives.

It is, perhaps, more important for research to assess the effects of instructional objectives, presented in the context of everyday classroom learning, exert on achievement. O'Brien et al. (1984) conducted a naturalistic study of the effects of teachers' use of knowledge level objectives (Bloom, 1956) on social studies achievement in eighth graders. O'Brien et al. (1984) found that prior achievement and level of exposure to instructional objectives were related to later achievement. While research on the role of instructional objectives in daily teaching, including teaching at the undergraduate level, is needed, research on what teachers actually do in the classroom suggests that they neglect instructional objectives (Peterson et al., 1978).

The aim of the present study is examine the effects of exposure to general, non-Magerian, instructional objectives in a college course in educational psychology. Students who were exposed to instructional objectives were explicitly informed that the midterm and final examinations would be keyed to the objectives (Duchastel and Merrill, 1973). The objectives highlighted important material presented in the text and in the lectures and discussions. An advantage of the present study is that student achievement in educational psychology prior to exposure to the objectives was as-

sessed and controlled.

Method

Subjects

A total of 102 City College undergraduates, 18 males and 84 females, enrolled in four educational psychology classes, participated in the study. The mean age of the participating students was 27.35. Nine students were white and 93, non-white. Approximately half the students attended a morning or an afternoon class in educational psychology during the fall semester. The other half attended a morning or an afternoon class in educational psychology during the spring semester.

Procedure

Students attending the morning classes (fall and spring semesters) were administered a ten-item multiple-choice test during the third week of the semester. Students attending the afternoon classes (fall and spring) were administered a different ten-item multiple-choice test during the third week of the semester. The purpose of the ten-item tests was to assess student mastery, *without* instructional objectives, of course content covered in the first two weeks of classes. The items on the brief multiple-choice tests modeled the type of items which would be found on the midterm.

After the ten-item tests were administered, each student in the two spring-semester classes was given a list of instructional objectives which underlined specific content needed to be mastered for the midterm. Examples of the instructional objectives are presented in Appendix A. The students were informed that the midterm would be based upon the objectives. After the 40-item multiple-choice midterm was completed, each student in the spring-semester classes was presented with a list of instructional objectives which highlighted specific content needed to be mastered for the 50-item mostly multiple-choice final (47 items were multiple-choice and three items required to the students to write instructional objectives). The same midterm and final examinations were administered to all classes; however, students attending the fall-semester classes were not exposed to the instructional objectives.

Two sets of analyses were performed: (1) the students attending the spring class which was conducted in the morning were compared to the students attending the fall class which was conducted in the morning; (2) the students attending the spring class which was conducted in the afternoon were compared to the students attending the fall class which was conducted in the afternoon. Multiple linear regression procedures were employed to assess the effects of exposure to instructional objectives, controlling for possible confounding factors.

Results

Reliability

Item analyses indicated that two items on the pretest administered to the morning classes and one item on the pretest administered to the afternoon classes showed very poor or negative item-total correlations and were not used in constructing pretest scales. An eight-item pretest scale was constructed for the morning classes and a nine-item pretest scale was constructed for the afternoon classes. The KR-20 reliability coefficients for the eight- and nine-item pretest scales were .50 and .61 respectively. Low reliability coefficients are to be expected in measures with few items. Comparable tests with 40 items would yield a reliability coefficient of .83 or higher (Nunnally, 1978, p. 243, Equat. 7-6). Since the pretest scales assessed content covered in the first two weeks of each semester, prior to the introduction of the instructional objectives to the spring semester classes, the pretest scales constituted a common control variable reflecting prior achievement in educational psychology unaided by objectives.

The split-half (odd-even) reliabilities for the midterm and final examinations were assessed in half the fall and spring students. The reliability coefficients for the midterm and final were .76 and .84 respectively.

Student Performance

Pretest scale score is reported as number correct; therefore, the highest pretest scale score was eight for the morning classes and nine for the afternoon classes. Scores on the 40-item midterm and 50-item final are reported as percentage correct.

The pretest scale was moderately related to the midterm ($r = .58$, $p < .001$ in the morning classes; $r = .51$, $p < .001$ in the afternoon classes) and final ($r = .52$, $p < .001$ in the morning classes; $r = .48$, $p < .001$ in the afternoon classes). Pooling morning and afternoon samples, age was negatively correlated with performance on the midterm ($r = -.25$, $p < .05$) but uncorrelated with performance on the final. Table 1 presents the mean scores of fall and spring students on the pretest scales, the midterm, and the final. Mean ages for the classes are also presented. In view of the pattern of differences depicted in Table 1 as well as the correlational results, age and pretest performance emerged as variables to be controlled in assessing the effects of exposure to the objectives.

Multiple Linear Regression Analyses

A number of multiple linear regression (MLR) analyses were conducted. In one MLR analysis involving all students attending the fall and spring morning classes, midterm performance was regressed on the eight-item pretest scale, age, and exposure vs. nonexposure to objectives (dummy coding). In a parallel analysis using all students attending the fall and spring afternoon classes, midterm performance was regressed on the nine-item pretest scale, age, and exposure to objectives.

The MLR analyses conducted to examine the effects of exposure to objectives on the final paralleled the analyses undertaken to examine the effects of objectives on the midterm, but with one difference. Students with an "A" average based on the results of the midterm and another course requirement, a book review, were exempted from the final and given an alternate assignment.

TABLE 1
Summary of Student Characteristics

	Morning Classes					
	No Objectives		Objectives			
Measures	Mean	n	Mean	n	t	p
Pretest Scale (8 items)	5.95	22	5.57	23	-.83	n.s.
Age	27.66	21	23.08	21	-2.42	.05
Midterm	68.00	25	64.58	24	-.95	n.s.
Final	59.13	23	59.15	19	.01	n.s.

	Afternoon Classes					
	No Objectives		Objectives			
Measures	Mean	n	Mean	n	t	p
Pretest Scale (9 items)	4.30	23	4.75	24	.82	n.s.
Age	25.83	23	31.74	27	2.08	.053

More students in the spring afternoon class (n = 4) than students in the fall afternoon class (n = 1) earned an exemption from the final. Thus, with fewer than expected "A" students the spring-term final, the size of the objectives-related effect on final exam performance was likely to be an underestimate.

Results presented in Table 2 indicate that, for the morning classes, exposure to instructional objectives exerted no effects on either the midterm or the final. By contrast, for the afternoon classes, instructional objectives exerted significant effects on performance on both the midterm and final. The unstandardized regression, or "B," weights index the magnitude of the effects (Cohen and Cohen, 1983). The B weights indicate that, controlling for age and prior achievement, in the afternoon students exposure to instructional objectives was associated with an approximate seven-point improvement in performance on the midterm, and an approximate eight-point improvement on the final. Each regression analysis also indicates that prior achievement predicted performance on the midterm and final regardless of exposure to the objectives. The results of the regression analyses were not materially changed when sex and race were controlled.

TABLE 2
Results of Multiple Linear Regression Analyses

Morning Classes

	B	SE B	p
Factors affecting midterm			
Age	.01	.29	n.s.
Eight-item scale	4.07	1.11	.001
Objectives	-1.92	3.38	n.s.
Factors affecting final			
Age	.28	.26	n.s.
Eight-item scale	3.31	.98	.01
Objectives	2.31	2.94	n.s.

Afternoon Classes

	B	SE B	p
Factors affecting midterm			
Age	-.61	.17	.001
Nine-item scale	3.27	.99	.01
Objectives	7.03	3.49	.05
Factors affecting final			
Age	-.30	.18	.10
Nine-item scale	2.73	1.02	.05
Objectives	8.12	3.61	.05

Discussion

The results provide modest support for the view that exposing college students to instructional objectives enhances achievement. The support is modest because only two of the four comparisons revealed an effect for instructional objectives. Consistent with a considerable literature, the results of the regression analyses indicate that prior achievement was predictive of current achievement.

Because subjects were not randomly assigned to objectives and no-objectives groups, the present study constitutes a quasi-experiment, not a true experiment (Cook and Campbell, 1979). Quasi-experiments are more vulnerable to alternative, selection-based explanations than true experiments. In the present study it is possible that selection bias accounts for the appearance of grater achievement in the afternoon students who were exposed to objectives. It is possible that more able students attended the spring, in comparison to the fall, afternoon class. Three results, however, suggest otherwise. First, the fall and spring afternoon students did not differ significantly on the pretest scale. Second, the mean age of the spring afternoon students was significantly greater than that of the fall afternoon students and age was negatively related to midterm performance, suggesting that students in the spring afternoon class were at a disadvantage compared to students attending the fall afternoon class. Third, the greater number of "A" exemptions in the

spring suggests that the assessed effect of objectives on the final, for the afternoon students, was an underestimate. Despite controls for age and prior achievement, the results should still be interpreted with caution. In a study in which subjects were not randomly assigned to groups unmeasured variables (e.g., motivational factors) may still account for group differences (Cook and Campbell, 1979; Judd and Kenny, 1981).

Instructional objectives are not a substitute for effective teaching. The observed effect sizes were, when they occurred, modest in size. Instructional objectives may, however, constitute a useful adjunct in teaching. To study the effects of objectives on the achievement of college students, it would be helpful if faculty from a variety of disciplines would systematically introduce instructional objectives as part of a series of small-scale studies. Estimates of the effects of exposure to objectives in a variety of academic contexts could then be made.

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Appendix A

10. Describe three approaches to language improvement: Tough, Engelmann, and Blank.

11. Distinguish between the native language approach and the direct method in bilingual education.

12. Differentiate nonstandard English (includes black English) from standard English. Identify their similarities.

30. Define and distinguish operant conditioning and classical conditioning.

31. Define and provide examples of how a teacher might use the following concepts:

operant	discriminative stimulus (SD)
positive reinforcement	primary reinforcers
negative reinforcement	secondary reinforcers
punishment	discrimination
extinction	generalization
time out	Premack principle
response cost	

37. Define and describe the following terms:

sensory detector	short-term memory
sensory synthesizer	long-term memory
attention	

38. Describe some of the applications of information-processing psychology in making instruction more memorable.