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A PILOT STUDY EVALUATING THE USE OF PROGRAMMED LEARNING IN THE TEACHING OF EXPONENTS TO AN INTERMEDIATE ALGEBRA CLASS AT LOS ANGELES VALLEY COLLEGE, SPRING, 1967.

BY- MACHETANZ, FREDERICK A. AND OTHERS
LOS ANGELES VALLEY COLL., VAN NUYS, CALIF.

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DESCRIPTORS- *JUNIOR COLLEGES, PROGRAMED TEXTS, PROGRAMED INSTRUCTION, INSTRUCTIONAL IMPROVEMENT, PROGRAMED MATERIALS, ACADEMIC PERFORMANCE, ACHIEVEMENT GAINS, MATHEMATICS MATERIALS, MATHEMATICS INSTRUCTION, COLLEGE MATHEMATICS, EXPERIMENTAL TEACHING, EXPERIMENTS,

THIS EXPERIMENT WAS DESIGNED TO DETERMINE THE EXTENT TO WHICH PROGRAMMED MATERIAL IS EFFECTIVE IN THE TEACHING OF EXPONENTS TO AN INTERMEDIATE ALGEBRA CLASS. ON THE BASIS OF SCORES ON A 24-ITEM MULTIPLE CHOICE TEST, 38 STUDENTS WERE DIVIDED INTO TWO MATCHED SECTIONS, WHICH HAD APPROXIMATELY EQUAL MEANS AND STANDARD DEVIATIONS. FOR THREE CLASS SESSIONS, THE EXPERIMENTAL GROUP WENT TO THE STUDY SKILLS CENTER TO WORK ON PROGRAMMED INSTRUCTION ON EXPONENTS, WHILE THE CONTROL GROUP RECEIVED REGULAR CLASS INSTRUCTION. A POSTTEST OF 24 ITEMS, PARALLEL IN CONTENT TO THE PRETEST, SHOWED THAT BOTH GROUPS GAINED, ALTHOUGH THERE WAS NO SIGNIFICANT DIFFERENCE BETWEEN THE GROUPS. THE EXPERIMENTAL GROUP SHOWED A GREATER VARIANCE, WITH SOME INDIVIDUALS MAKING NEGATIVE GAIN SCORES. THOSE WHOSE GAINS WERE LOW OR NEGATIVE WERE OBSERVED TO SPEND LESS THAN HALF OF THE ASSIGNED TIME IN WORK ON THE PROGRAMMED TEXTS, WHILE THE REGULAR CLASS INSTRUCTION APPEARED TO ENCOURAGE A MORE UNIFORM ACHIEVEMENT. (WO)

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INTRODUCTION

During the last decade the use of programed instructional materials has become widespread. Each new year sees a torrent of new programs. While users almost unanimously "feel" that programed learning is a valuable adjunct to instruction, there is a dearth of validating evidence.

In the past five years Los Angeles Valley College has accumulated an excellent library of programed materials. In the area of mathematics, there are numerous programs at all levels. However, local studies of the use and effectiveness of these materials have been primarily descriptive in nature. The following study will attempt to provide some experimentally derived information on the value of programed learning as a tool to assist in the teaching of mathematics. In particular, this study will investigate the effectiveness of a specific program* in the teaching of exponents to an intermediate algebra class at Los Angeles Valley College, Spring, 1967.

STATEMENT OF THE PROBLEM

In order to provide some experimental evidence as to the validity of programed learning, this study will attempt to answer the question,

* Howes, V. Self-Teaching Intermediate Algebra. New York: Wiley & Sons, 1963.

"To what extent is programed material effective in the teaching of exponents to an intermediate algebra class?"

PROCEDURE

During the fifth week of the spring semester, 1967, at Los Angeles Valley College, thirty-eight students in an intermediate algebra class were given a pre-test in exponents. The test contained twenty-four multiple-choice problems representative of the types of problems typically covered in the section on exponents. The papers were then scored and the class divided into two sections matched on the basis of pre-test scores. Consequently, the two sections had equal means and approximately equal standard deviations.

For the next three days, Section Y was sent to the study skills center to work on the section on exponents in the programed text, Dubisch and Howes, while Section X received three days of regular class instruction on exponents.

At the conclusion of the three days a post-test was given to both sections. The post-test contained twenty-four multiple-choice problems and paralleled in content the pre-test. The results of both pre and post-tests are shown in the next section.

FINDINGS

Of the nineteen students in the control group who received experimental instruction, eighteen took both pre and post tests. The mean raw score increase for these students was 4.7. Sixteen of the students in the experimental group of nineteen completed both these tests and these students showed a mean raw score increase of 4.6. Although small numbers are involved, there is no indication of a significant difference in the gains of the two groups.

It is noted that the experimental group showed a wide range of improvement, some achieving a negative gain. A summary of the two groups' performance follows with a complete tabulation of results shown in Table I.

SUMMARY OF PERFORMANCE OF CONTROL AND EXPERIMENTAL GROUPS

		Control Group (n=18)	Experimental Group (n=16)
Pre-test:	Mean Raw Score	11.5	11.2
	S.D.	4.1	4.7
Post-test:	Mean Raw Score	16.2	15.8
	S.D.	3.8	4.9
Gain:	Mean Raw Score	4.7	4.6
	S.D.	2.5	4.2

DISCUSSION

There are many variables in an experiment of this type. The following list suggests some that would seem to be important.

Subject matter and topic
Skill and motivation of the student
Skill and methods of the instructors
Programed material available
Congruence of programed material to class instructional material
Bias produced because of experimental conditions
Time spent in study by experimental and control groups

In spite of small numbers and numerous uncontrolled variables, there is a clear indication that students who are diligent in their use of selected programed material can increase their performance on an achievement test in a given area. As always, motivation plays a part in an individual's achievement and it was noted that some of the individuals scoring low or negative gains spent less than 50% of the time assigned to the programed texts. On the other hand, those students attending class seemed to achieve more uniformly.

Although there is a danger that the increased use of programed material may further depersonalize the already tenuous interpersonal relationship existing between instructor and student, it is believed that there is significant value in the use of programed material as an adjunct to the instructional process.

In addition, to minimize the danger of misguiding students to inadequate or unappropriate programs, trained counselors or advisors should be available for proper student direction.

Finally, it is hoped that all personnel involved with instruction will become increasingly aware of the type and quality of programed material available in their areas of specialization and when appropriate will test experimentally the usefulness of this programed material for their needs.

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TABLE I

PRE AND POST TEST SCORES FOR CONTROL AND EXPERIMENTAL GROUPS

Section X (Control)				Section Y (Experimental)			
Student	Pre Test X	Post Test X'	Change ΔX	Student	Pre Test Y	Post Test Y'	Change ΔY
1.	9	14	+5	1.	10	19	+9
2.	9	17	+8	2.	18	19	+1
3.	6	13	+7	3.	8	8	0
4.	13	16	+3	4.	14	16	+2
5.	8	20	+12	5.	18	22	+4
6.	7	8	+1	6.	7	16	+9
7.	7	13	+6	7.	9	11	+2
8.	11	16	+5	8.	18	17	-1
9.	6	10	+4	9.	7	12	+5
10.	10	13	+3	10.	11	10	-1
11.	17	20	+3	11.	6	17	+11
12.	20	21	+1	12.	16	22	+6
13.	18	23	+5	13.	16	21	+5
14.	12	15	+3	14.	8	11	+3
15.	12	17	+5	15.	4	9	+5
16.	15	19	+4	16.	9	23	+14
17.	16	20	+4				
18.	11	17	+6				