DOCUMENT RESUME

ED 044 550 AC 008 577

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TITLE	Learning 100 System Use with Project 100,000 Inductees, Fort Polk Training Center.
INSTITUTION	Educational Developmental Labs., Inc., Huntington, N.Y.
REPORT NO	RIP-3
PUB DATE	Sep 69
NOTE	15p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$0.85
DESCRIPTORS	Achievement Tests, *Enlisted Men, *Low Ability Students, *Military Personnel, Participant Characteristics, Post Testing, Pretests, Program Evaluation, *Reading Level, *Remedial Reading, Research, Sampling, Statistical Analysis
IDENTIFIERS	Learning 100, *Project 100,000, United States Army

ABSTRACT

A sample of 353 young men, inducted into the Army under the category of "Project 100,000" personnel, participated in an experimental training program using the Learning 100 multimedia communication skills system in an attempt to correct academic deficiencies. The sample, which had scored below 4th grade reading level, was divided into 14 experimental classroom groups. A three-week time period was established by the Fort Polk staff for the instructional program. A second 3 weeks was available for those subjects who did not reach the 5th grade in the first section. Civilian instructors provided the instruction. The men were placed in levels according to their score in the USAFI pretest. Levels of instruction were comprised of instructional sequences called cycles within which were a variety of activities: perceptual accuracy and visual efficiency training; an experience building segment; skill building activities; and a new skills application and enrichment segment. Approximately 84% of the sample attained 5th grade reading levels on the achievement test given after three weeks; grade completed prior to induction, and entry reading score were significantly correlated with regressed gain; and raw score mean achievement (USAFI Reading Subtest) increased from 14.63 to 25.80 after three weeks of instruction. (PT)

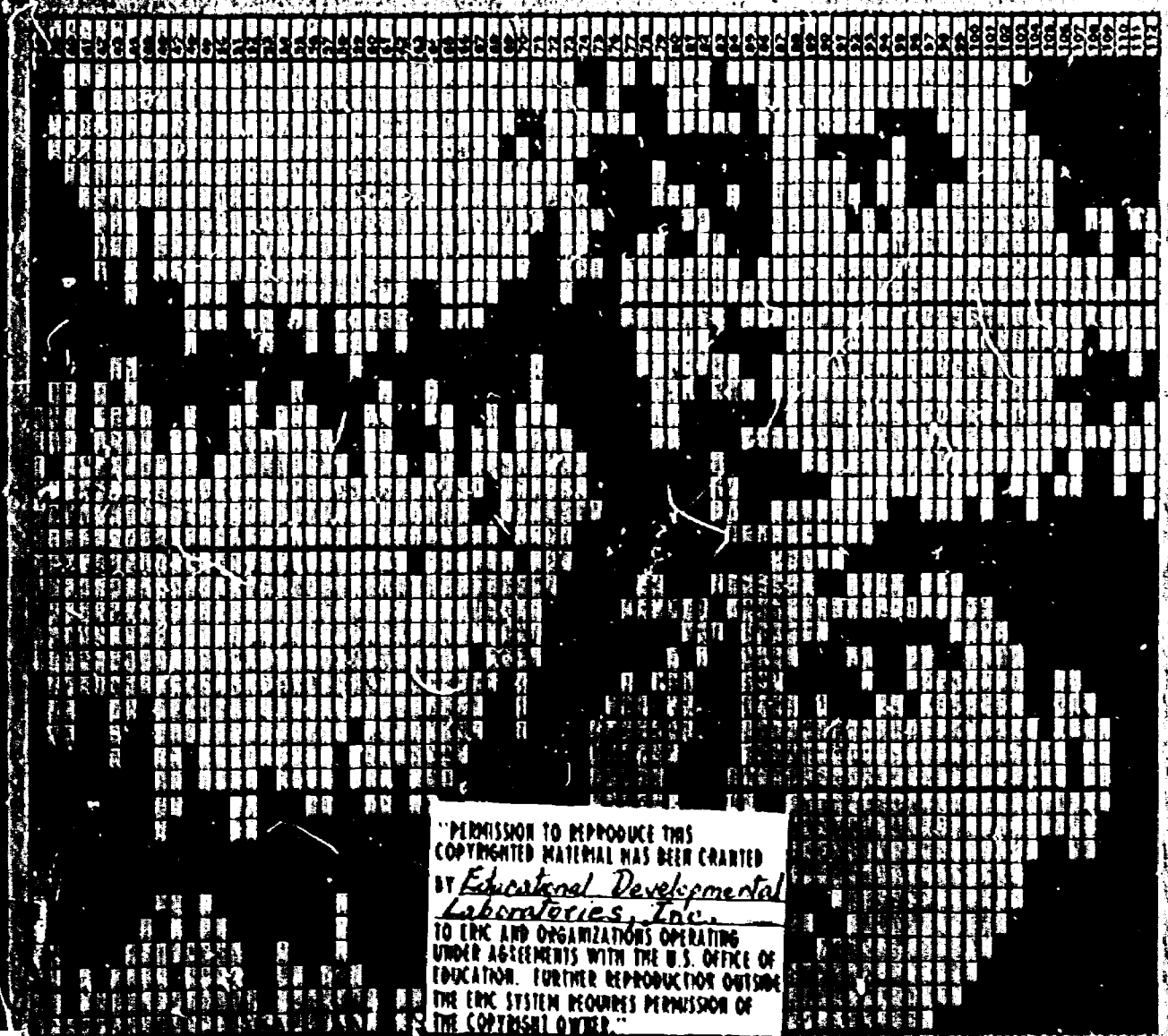
EDL RESEARCH & INFORMATION REPOR

AC N-X

No. 3

September 1969

LEARNING 100 System Use with Project 100,000 Inductees, Fort Polk Training Center



Research and Information Report No. 3
EDL Research Department, September 1969

LEARNING 100 System Use with Project 100,000 Inductees, Fort Polk Training Center

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10-1-69 Printed in U. S. A. Order No. 380563

STATISTICAL DESCRIPTION OF THE SAMPLE

On the average the young men in the project had completed more than ten years in school. In fact, 50.7 per cent of the sample had completed the twelfth grade and eight men had attended one or more years of higher education.

Discounting the total number of years of school experience, the reading level of the sample ranged from the third- to fourth-grade level according to established norms of the USAFI test. An alternate form of the USAFI test was administered to the sample following ninety hours of reading instruction using the Learning 100 system produced by Educational Developmental Laboratories, Inc. The average raw score achieved at this testing reflected a grade placement at approximately the seventh-grade reading level.

The change in raw score reflects an entirely satisfactory gain. Two factors should be considered in these gain scores, however. Any observed test score for an individual must be considered to be the sum of two components: the true score for the individual and error. For a normally distributed sample of the population, these errors are assumed to be as likely positive as negative and, for a large sample, their mean will be zero. Note that this assumption can be made for a normally distributed sample; a sample that has a mean which can be assumed to be equal to the population mean of the norming group.

When a sample is selected because of its relative position below or above the mean for the theoretical population, it must be assumed that extremely low scores will be lower than the true score for the individual and extremely high scores will be higher than the true score (a statistical phenomenon). The true score is, of course, the measurement of concern. Therefore, if a sample is selected because it is below the established population mean, as was the sample in the present study, a correction must be made on entry scores since scores on a subsequent testing would be expected to regress toward the population mean. The amount of this regression is a function of test reliability and the distance an individual score is from the population mean. For example, on an IQ test with a population mean of 100 and reliability of .80, the true score of an individual who has an observed score of 70 is assumed to be 76, the population mean less reliability of the test multiplied by variance from the mean:

$$100 - .80\ (30) = \text{true score estimate}$$

$$100 - 24 = 76$$

By analogous reasoning, an individual who has an observed score of 130 on the IQ test has an estimated true score of 124.

In October, 1966, President Johnson directed the Selective Service Commission to lower induction standards for 100,000 young men. This directive allowed induction into the Armed Forces of men previously deferred from the draft for mental or physical reasons and provided for remedial treatment to raise their qualifications or correct their deficiencies. The present study is a report of an academic training program in one Army Training Center in which Project 100,000 personnel were placed for instruction in reading, mathematics, and social studies. This study reports the gains made in reading by this sample of students.

INTRODUCTION

In October, 1966, the Selective Service Commission was directed to select eligible young men for the armed services who had previously been refused induction because they failed to meet certain requirements. Fifteen per cent of the inductees selected for this project, called "Project 100,000," had some sort of physical problem which would be corrected in government hospitals or under the direction of government personnel. The majority of those to be inducted, however, were young men who had failed to achieve at a successful level on academic tests.

A training program was planned to correct academic problems largely related to reading level. The Learning 100 system produced by Educational Developmental Laboratories, Inc., was selected in July, 1967 by the Education Director of the U.S. Army Training Center at Fort Polk, Louisiana, to be used experimentally in this project. This study was concerned with 353 trainees over a three- to six-week period.

Young men who scored at or below fourth-grade reading level, on the United States Armed Forces Institute (USAFI) test administered after induction, were placed in fourteen experimental classroom groups. A three-week time period was established by the Fort Polk staff for the instructional program. (A second three weeks was available for those subjects who did not reach fifth-grade level in the first section.) Two hours each weekday and four hours on Saturday were devoted to military training and six hours each weekday were devoted to academic training. The primary emphasis (twenty hours per week) was in the area of reading improvement although ten hours per week were devoted to the cognitive areas of social studies, citizenship, and arithmetic.

An achievement test was administered following the first three weeks of instruction. Those men who scored at fifth-grade reading level or beyond terminated training at this point and those who scored below the expected level continued in the training program for an additional three weeks. Approximately 84 per cent of the sample achieved levels beyond the fifth-grade level at the end of three weeks. Therefore, for the purpose of this paper, only scores from this testing were analyzed. This tends to make the findings presented in this study rather conservative, since 57 men scored at extremely low levels and yet their results were included in the computations.

Each entry reading score was, therefore, converted by this method to a regressed score to avoid the possibility of considering spurious gain due to the regression effect as part of the legitimate gain of the student due to treatment (reading instruction).

A second factor that might be considered to be contributory to the large gain scores observed is the practice effect or memory factor associated with tests administered during relatively short periods of time. It has been assumed that subjects will remember how they marked an item on a first testing and mark an item the same way on a second testing whether the initial response was right or wrong. Two arguments tend to diminish the effects of practice for the present study. First, an alternate test form was used on the second testing which means that the items were similar in type but not the same items. Second, in testing of this type, the experimenter is interested in determining the change in behavior in approaching a specified type of item.

> If persons remember how they answered the item the first time, this may be due largely to the fact that they recall the mental processes through which they went in arriving at the answer. The extent to which the same stimulus evokes the same response a second time is precisely what we want to determine by the retest reliability estimate.[1]

[1] Horst, Paul, Psychological Measurement and Prediction, Wadsworth Publishing Co., Inc., Belmont, California, 1966. Page 265.

The mean values provided in Table I were computed for each of the fourteen instructional groups.

TABLE I

MEAN VALUES OF FOURTEEN FORT POLK READING GROUPS FOR 353 PROJECT 100,000 TRAINEES

Group	N	Last Grade Completed	Entry Reading Score[a]	Reading Score After Training[b]	Gain on Regressed Scores
A	32	10.4	13.43	27.18	12.56
B	30	10.7	14.58	23.54	7.80
C	30	10.6	16.53	25.40	7.80
D	20	9.5	13.80	25.25	11.47
E	15	9.5	13.93	23.75	9.88
F	31	9.4	14.41	27.06	11.45
G	31	10.7	13.93	24.61	9.42
H	30	10.4	16.33	26.13	8.77
I	29	11.6	14.79	27.03	10.79
J	34	11.0	15.41	26.21	9.74
K	18	9.8	15.00	28.61	12.44
L	16	10.4	14.12	25.18	10.00
M	17	10.8	14.29	22.52	7.63
N	20	10.2	15.10	26.00	9.80

[a]Raw scores on USAFI Reading subtest, Form D
[b]Raw scores on USAFI Reading subtest, Form A

Mean values and standard deviations in Table II were computed for the total sample. Sample range for 68 per cent of the men is also provided in Table II. These values indicate the range within which approximately 240 men scored. For example, the mean entry reading score for the 353 men was 14.63 and approximately 240 of these men (middle 68 per cent) scored between the values of 12.31 and 16.59.

TABLE II

MEAN VALUES, STANDARD DEVIATIONS, AND SAMPLE RANGE FOR 353 PROJECT 100,000 TRAINEES

	$\bar{X}$	SD	Range for 68% of Sample
Last Grade Completed	10.40	.70	9.70 - 11.10
Entry Reading Score[a]	14.63	2.32	12.31 - 16.95
Reading Score after Training[b]	25.49	2.87	22.62 - 28.36

[a]Raw scores on USAFI Reading subtest, Form D
[b]Raw scores on USAFI Reading subtest, Form A

INSTRUCTORS OF THE L-100 SYSTEM

The instructors selected to participate in the study were civilian personnel. They all had degrees in education and, in general, had previously had one or more years of experience in the teaching of reading at the elementary level.

Each instructor taught two four-hour sessions each day. No teaching aides were provided and time for planning had to be taken from these four-hour time blocks. Original training for use of the system and classroom management was conducted by EDL personnel for the instructor directing the reading program. Subsequent training of reading instructors was done by this instructor. Information on exact instructor training schedules and the amount of in-service training, if available, was not provided.

ENTRY LEVEL

In general, the men were placed in levels of the L-100 system based upon the results of the USAFI pretest and students were placed one level below their entry reading score. Therefore, a man who scored within the range of fourth-grade level on the USAFI test began work at the L-100 CA level (CA is the approximate third level of reading in terms of vocabulary and reading comprehension). Students placed

in the higher levels were those men who had scored at a high level relative to the sample and who appeared to the instructor to have adequate vocabulary. Placement into the higher levels was, therefore, at the direction and discretion of the instructors.

Table III is a summary of entry levels for the total sample and level placement at the time of the three week testing.

TABLE III

ENTRY AND FINAL READING LEVELS OF L-100 STUDENTS

Entry Level	No. of Students	Level Placement After Three Weeks						
		RA	AA	BA	CA	DA	EA	FA
RA	10		5	2	2	1		
AA	18		2	7	9			
BA	78			8	42	24	3	1
CA	106				2	67	31	6
DA	81					2	68	11
EA	60						19	41
FA	0							
TOTAL	353		7	17	55	94	121	59

Levels of instruction are comprised of instructional sequences called cycles. Within each cycle there is a variety of activities: perceptual accuracy and visual efficiency training with the Tach-X instrument, an experience building segment which provides for group discussion of content areas, skill building activities which assist the students in the acquisition of new vocabulary, word attack skills, listening and reading comprehension training, and fluency training in silent reading, and an application and enrichment segment during which the student applies the newly acquired skills in a variety of communication skills activities. Elements or segments of the cycle in which an individual student was proficient, as a result of prior experience, were omitted. This contributed appreciably to the individualization of the system for the student; each student could progress at his own rate and omit the elements of instruction in which he had proficiency resulting from prior training.

The four-hour block of time provided for students in the present study contributed to rapid advancement through cycles and, therefore, levels of instruction. It is likely that at least two cycles could be completed during the time allotted.

The readiness (RA) level has been designed for nonreaders. Ten two-and-one-half-hour sessions, approximately 25 hours, are required to complete all aspects of this level. During this level, the student develops a basic sight vocabulary of ninety words in addition to developing auditory and visual discrimination skills, eye-hand coordination, directionality, and the ability to recognize, name, and copy letters of the alphabet. For the present sample, half of the ten men who started at this level progressed quite rapidly through the sessions with minimal review of elementary processes.

The majority of the sample (202 men) entered at the AA, BA, and CA or elementary reading levels. Acquisition of extensive sight vocabulary, visual-functional, perceptual, and word attack and study skills are stressed during these levels. Each level of L-100 includes thirty cycles each of which take approximately two and one-half hours to complete. Although, for a sample of this type (men with many years of recent school experience), many of the cycles could be completed relatively quickly. Thus, the majority of the time allotted to reading could be devoted to increasing sight vocabulary and development of word attack skills through small-group instruction.

Approximately one-third of the sample began their work in the intermediate levels (DA or EA). These men were assumed to have developed skills at an approximate fourth-grade level. This placement presupposed adequate development of aural and visual perceptual skills and independence in word attack skills. Each level is based upon thirty sessions of work each of which requires about two hours for completion. In addition to reinforcement activities for previously developed skills, there is an emphasis on the development of reading comprehension, listening-auding skills, and study skills related to specific content area.

Progression through the cycles (instructional sequences or sessions) and levels is, by design of the L-100 system, individualized. Some men were able to complete two to three times the number of cycles as were their classmates.

CORRELATIONAL DATA

Correlations were computed to determine the relationships between the variables. Table IV provides the matrix for the measures considered.

TABLE IV

MATRIX OF CORRELATION COEFFICIENTS FOR DEPENDENT AND INDEPENDENT VARIABLES

	Grade Completed	Entry Score	Final Score	Regressed Gain
Grade Completed	1.0	.17	.04	-.03
Entry Score		1.0	.31	-.30
Final Score			1.0	.69
Regressed Gain				1.0

The last grade completed by the men correlated significantly ($p < .05$) with initial reading ability as measured by the USAFI instrument. This correlation would be expected. It confirms the assumption that a man who had completed 12 years of school would tend to score at a higher level on the pretest than would a man who had completed only 8 years of school. It might also be assumed that the number of years of school completed by the students would correlate significantly with the final score and the amount of gain since prior experience in an academic environment should increase the students' ability to learn. However, this assumption was not confirmed by the data.

Entry reading score, the result of the pretest, correlated significantly with final score. This simply indicates that students would tend to score as high or higher on the posttest as they scored on the pretest. An interesting result, a finding that would not be expected, was the correlation found to exist between entry reading score and the amount of gain achieved by the student. The correlation was found to be highly significant ($p < .01$) and negative. This means that men who entered the training program at extremely low levels of achievement made much more pronounced gains (after their scores were regressed toward the population mean) than did students who entered at higher levels. This result might indicate that the L-100 system was relatively more effective with men who initially had more serious learning problems or problems of underachievement. For example, a man who had a raw score of 10 upon entry into the program (and a regressed entry score of approximately 12), would tend to gain more proportionately than would a man who entered the training program with a raw score of 20.

Final reading score, the result of the posttest, was highly correlated with the regressed gain score. This result follows logically from the preceding findings. The final score attained by the student was highly related to the amount of gain achieved.

SIGNIFICANCE OF DIFFERENCES BETWEEN PRETEST AND POSTTEST MEASURES

When pretest and posttest measures (two measurements on the same subject) comprise the data, a special "t" model must be used to test the significance of difference between the pretest mean and the posttest mean. This form of the t-test provides for an adjustment of the t-test commensurate with the correlation between the two measures. An alternate, and perhaps more meaningful, method consists of finding the differences between the two measures and treating these differences as raw scores. The mathematical model, then, tests whether the difference is due to chance fluctuation of scores or if it can be attributed to some defined factor, i.e., the treatment or training provided. Such a test was performed and it was found that the differences attained by subjects in the present study were highly significant ($p < .01$).

Table V summarizes mean achievement, standard deviation of mean achievement, and the computed t-test value for the present study.

TABLE V

A COMPARISON OF DIFFERENCE SCORES ON PRETEST AND POSTTEST USAFI RESULTS

Test	Number	Raw Score Mean	Raw Score S.D.	"t"
USAFI, Form D (Pretest)	353	14.63	2.32	
				22.25**
USAFI, Form A (Posttest)	353	25.49	2.87	

**$p < .01$

SUBJECTIVE EVALUATION

In an experiment of this type, it is of interest to examine the cases of failure as well as those of success. Why a young man fails in such a situation is of vital concern since these reasons may direct the attention of instructors, program directors, and system editors to the types of problems encountered and possible problem solutions.

Fifty-seven men did not achieve passing levels (fifth grade or above) at the end of three weeks of instruction. These men continued classwork for three additional weeks and were retested. At this point, thirty-five men had attained passing reading levels and twenty-two were considered failures. The instructors of the reading groups were asked to evaluate these latter young men who did not pass the reading test after six weeks of instruction. It was determined from this information that there were basic categories of reasons that accounted for failure.

Many men, according to the instructors, had such poor academic backgrounds and so many problems in the cognitive area as to be at a distinct disadvantage which was insurmountable during a six-week period. The following comments were typical descriptions of this type of student:

> His ability was limited. He could not understand what he was reading.
>
> He had trouble remembering how the letters sound.
>
> He was able to write letters and read letters from home which he couldn't do before.
>
> He accomplished as much as any man I have taught although his score did not indicate it.
>
> After six weeks he was (only) able to sound out second-grade words.

A second group of students who were not able to achieve at the fifth-grade level or above were, according to the instructors, so tense and unsure of themselves that they were unable to function successfully either during class or in a testing situation. Representative instructors' comments were:

> During the first few days of his time here he had an emotional breakdown as a result of past defeats in learning and fear at being in school again.
>
> He learned a great deal in the program but he is still too afraid of failure.
>
> Although he was quite nervous during testing, his failure was certainly unexpected.

There were cases of poor discipline, lack of maturity, and inappropriate social behavior. These young men were unable or unwilling to conform to and operate within the defined behavior structure. Classes were managed by the instructors who were civilian personnel rather than military and the behavior standards were, therefore, not unlike standards in public school situations. The following instructor comments were selected to indicate the types of problems encountered:

> This man had immediate problems outside the classroom and may be facing a general court martial for his conduct in the barracks.
>
> He was never serious about learning and was always laughing inappropriately. He functioned as a little boy.

He would hide his books to keep from doing work. His major defense was to fall asleep when called on.

He had to be carefully supervised at all times as he wanted to sleep or play.

Some of the men had compelling personal problems that interfered with their ability to perform successfully in the school setting. Deaths in the immediate family and family situations that required personal leave to return home required time away from class. There were also a limited number of problems which may have been physiological that contributed to failure. Such factors as speech defects or severe difficulties in the area of auditory discrimination were felt to be contributory to failure in some cases. It was the opinion of the instructors that at least two of the men failed the final test deliberately, believing that they would be allowed to remain in the classroom an additional three weeks.

It is of interest to note that the subjective opinions of teachers regarding student failure are not unlike those opinions that would be expected from a sampling of any group of teachers for any sample of students. This observation may indicate that adult students are much like students in any school with similar social and learning problems or it may simply be a function of the approach or mind-set of teachers confronted with students who, for complicated and often undefined reasons, cannot succeed in an academic setting.

SUMMARY

A sample of 353 young men, inducted into the Army under the category of "Project 100,000" personnel, participated in an experimental training program using the Learning 100 multimedia communication skills system in an attempt to correct academic deficiencies in a three- to six-week training program. It was assumed that the basis of these deficiencies was related to inadequate reading level (third- or fourth-grade level). Based upon test data collected from the USAFI reading instrument and submitted by training personnel, the following conclusions can be drawn:

1. Eighty-four per cent of the sample attained reading levels of fifth-grade level or above after three weeks of intensive training; ninety-three per cent of the sample attained fifth-grade level or above after six weeks of instruction.

2. Grade completed in school prior to Army induction was not highly correlated with the regressed gain scores or with final achievement scores.

3. Entry reading score and final reading score were significantly correlated ($r = .31$, $p < .01$).

4. Entry reading score and regressed gain score were significantly correlated ($r = -.30$, $p < .01$). This negative correlation indicates that students entering the program at low achievement levels exhibited greater gain, even after the scores were regressed, than did students who entered at higher levels.

5. Raw score mean achievement on the pretest (USAFI Reading subtest, Form D) was 14.63 and increased to a mean achievement of 25.49 (USAFI Reading subtest, Form A) after three weeks of instruction.

6. The change or difference scores between pretests and posttests were significantly different ($p < .01$). This indicates that the differences obtained were not due to chance and could be attributed to the treatment.