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ABSTRACT

A comparison between standard kindergarten programs and AEL's preschool program was conducted to gain some insight into the desirability of using the laboratory-developed procedures rather than standard classroom procedures for affecting learning in 3-, 4-, and, especially, 5-year-old children. Initial differences in intelligence test scores were observed. The group which received all components of AEL's Preschool Education Program achieved higher scores than a control group on all three parts of the test designed to measure achievement of cognitive objectives. The kindergarten group also achieved higher scores on one part of the test of cognitive objectives. The girls in all treatment groups outscored the boys on most tests. AEL's program was shown to reach the objectives measured by two subtests where other programs including the standard kindergarten program did not. The achievement of these objectives implies that AEL's Preschool Education Program is an acceptable, if not preferred, alternative to other early childhood education programs. (Author/CK)

A Comparison of AEL's Preschool Education Program With Standard Kindergarten Programs

Technical Report No. 23

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TABLE OF CONTENTS

Chapter 1

List of Tables

Table

List of Figures

Figure

A Comparison of AEL's Preschool Education Program with Standard Kindergarten Programs

Introduction

The Appalachia Preschool Education Program developed by the Appalachia Educational Laboratory has been field tested for the past three years, beginning in the fall of 1968. The program was designed for children 3, 4, and 5 years of age living in rural areas of Appalachia. Elements of the program include a daily 30-minute television program seen by the children in their homes; a weekly visit by a paraprofessional home visitor who discusses the program with parents, confers with children, and delivers curriculum materials; and attendance by the children in a mobile classroom once each week for one and one-half hours. A more complete description of the program is given in the Evaluation Summary Report (1971) which is available from AEL.

The original evaluation design for the three-year field test did not include a comparison with standard kindergarten programs, primarily because there seems to be little consensus on the objectives for kindergarten programs. The objectives for AEL's preschool program were based on diagnosed needs (Hooper and Marshall, 1968) of Appalachian children, and the program was designed to meet those objectives. The Appalachia Preschool Test, an instrument designed to measure the degree to which those objectives had been reached, was constructed and administered to various treatment groups.

The field test site was in eight counties surrounding Beckley, W.Va. The superintendents and other school personnel from the eight counties in the field test area met with Laboratory personnel in Beckley, W.Va., in September, 1970. These educators suggested that AEL's preschool program be compared with kindergarten programs then in operation in urban centers. They were curious whether gains in cognitive and social skills among children in kindergarten programs and the AEL program would be similar. Since the AEL program cost was only about one half that of a kindergarten program, considerable savings would result if it could be shown to achieve comparable

results. The AEL program offered the further advantage of reaching children living in remote areas not normally served by kindergartens. As a result of the meeting with local school officials, an agreement was reached with Mercer County Public Schools for the Laboratory personnel to administer pre and post-tests to children attending kindergartens in Princeton and Bluefield, W.Va.

Purpose of the Comparison

The purpose of comparing achievement gains between standard kindergarten programs and AEL's preschool program was to gain some insight into the desirability of using the Laboratory developed procedures rather than standard classroom procedures for effecting learning in 3-, 4-, and especially 5-year-old children. The Laboratory development team was of the opinion that the needs of Appalachian children could be more effectively met through the multimedia approach. The more global purpose of this and all evaluation efforts was to provide information to those persons making educational decisions in a manner so that the decisions can be based on expected outcomes.

Description of the Comparison

The comparison between standard kindergartens and the AEL preschool program was completed as a part of the total evaluation of AEL's Preschool Education Program. The different treatment group samples and analyses are described in the summary report and other evaluation technical reports. The following description of samples and analyses performed is especially pertinent to the kindergarten comparison.

Description of the Samples

The children who received the AEL preschool program were in three treatment groups. The first group of 31 5-year-old children had access to a daily television program, were visited by a paraprofessional home visitor, attended a mobile classroom, and were therefore labeled TV-HV-MC. The second treatment group of 49 5-year-old children received only the television lesson and home visitor (TV-HV) and the third group of 31 children only had access to a television program (TV only). These children were located in south central West Virginia, and were initially randomly selected from a geographical grid to participate in the different treatment groups. In addition to the 5-year-old children, there were about equal numbers of children in the different treatment groups who were 3 and 4 years of age at the beginning of the program year, but only those who were 5 years of age were used in the statistical comparisons with the kindergarten children.

In addition to the three treatment groups, a control or no-treatment group was located in Monongalia County in northern West Virginia. The region

was similar to the field test area in topology, and the group was selected to be of a similar socioeconomic level. The region was out of the receiving range of the AEL instructional television program. There were 34 5-year-old children in the control group, and the testing was completed by the Human Resources Research Institute of West Virginia University.

Only about one half of the children (randomly selected) in these four groups received pretest scores, so smaller sized groups will be observed on pretests than on post-tests.

The kindergarten groups were located at Knob Elementary School in Princeton and Preston Elementary School in Bluefield, W.Va. The children attended kindergarten for a half day, and both groups were in the viewing area of the television program. Pre and post data were collected on 31 children in Princeton and 35 in Bluefield for a total of 66 kindergarten children, and both groups were combined as the kindergarten sample. The morning session in each kindergarten was from 8:30 to 11:30, the evening session from 12:00 to 3:00, and both included a lunch period. According to a program description by Mercer County Schools (1970), first consideration in enrollment was given to children from economically disadvantaged families. The pretesting was conducted in early October, 1970, and the post-testing was completed in June, 1971.

Instrumentation

The Appalachia Preschool Test (APT) was used to compare cognitive achievement among the various groups. The test was designed to measure the specific objectives of the program.

The test was revised each year as formative evaluation results indicated the need for program changes, and the different parts represent additional learning objectives. Part 1 of the APT consists of an interview with the child in order to build a readiness for testing, and the results are not included in this report. Part 2 is a 61-item test, developed by the AEL staff early in 1969. It consists of a variety of tasks, with the following number of items comprising the total: vocabulary - 15 items; relational terms - 14 items; letter and number recognition - 6 items; mathematical sets - 4 items; geometric shapes - 4 items; and beginning and ending sounds - 8 items. The remaining 10 items were related to body parts, calendar dates, and time related terms. Parts 3 and 4 of the APT were not used in the present testing.

Part 5 of the APT includes 18 items which measure logical reasoning, sensory discrimination and labeling, and letter recognition. It was intended to supplement Part 2. Part 6 also is comprised of 61 items and was primarily in multiple choice format, as was Part 2. All three subtests are made up of items designed to measure program objectives as the program evolved during the three-year field test.

The Peabody Picture Vocabulary Test (PPVT) was intended as a measure by which the equivalence of two groups could be determined and as a means of adjusting scores on the attainment of program objectives. The PPVT consists of a series of 150 plates, each consisting of four separate illustrations. One of the four illustrations on each plate corresponds to a word given by the examiner, and the child is asked to identify the correct plate. The test continues until a series of six incorrect answers in eight responses is given. A total raw score of correct responses is recorded, and a Mental Age (MA) is derived from the total score. In addition, raw score and chronological age are used to derive a deviation IQ score, utilizing a mean of 100 and standard deviation of 15. A more complete description of the nature and use of the PPVT is included in Technical Report No. 13.

Socioeconomic data were collected on a form designed by the Laboratory. The questions pertained to community size, education of parents, occupation, and family income. The data were coded so that Hollingshead's Two Factor Index of Social Skills (1957) could be recorded for each head-of-household, and it was used to compare the background of the different treatment groups. The scores vary from "5" for an individual in the lowest categories of income and education to a "1" for an individual in the category with highest income and most education.

Description of Analyses

The PPVT raw scores and age in months were used as covariates in a two-way analysis of covariance of the data from the test of cognitive objectives. The two levels were two sexes and five treatment groups (TV-HV-MC, TV-HV, TV only, no treatment, and kindergarten). All children were approximately 5 years old. Age and PPVT raw score were used as covariates rather than PPVT IQ alone because the latter is a derived score rather than a direct measure. The purpose in using covariance analyses was to adjust the post-test means according to initial differences in age and PPVT raw score among the different groups. In effect, the post-test achievement scores were adjusted insofar as the achievement was related to differences in age and intelligence test scores among the treatment groups. The pretest scores are presented for the APT subtests, but no analysis is reported for them.

Analysis of variance and analysis of covariance were computed using a program which adjusts for unequal cell size. A statistic called ETA squared (η^2) was used in the analysis of variance tables to indicate the proportion of variance attributed to each level (Hays, 1963, pp. 546-548). For example, 8.2 percent (.082 x 100) of the variance in PPVT raw scores was attributed to differences among treatment groups as indicated in Table 23.2. The means for treatment groups were adjusted by covariance and are shown graphically. Dunnett's tests (Myers, 1966, p. 337) were used to identify significant differences between individual treatment group means when the analyses of variance and covariance were significant. The adjustment in means through

covariance usually was about .1 to .3 raw score points and always less than one point. The adjustment also always raised the scores of the control and TV only groups with respect to the other treatment groups.

Analysis of Peabody Picture Vocabulary Test, Age, and Socioeconomic Differences

The two variables used as covariates in an analysis of differences in cognitive achievement reported in a later section were PPVT raw scores and age in months. Therefore, the analyses reported in the following section are designed to indicate differences in measured intelligence and age among the different treatment groups. In addition, the derived PPVT IQ scores and socioeconomic data are presented so that differences in intelligence as measured by the PPVT and socioeconomic background may be observed.

PPVT Raw Score

The raw scores displayed in Table 23.1 indicate that the 16 males who received the mobile classroom, home visitor, and television program (TV-HV-MC) received the highest mean score (61.4) on the post-test. The lowest score of 52.7 was obtained by the girls in the same treatment group. The gain scores are exhibited in a similar manner; the seven females in the TV only group achieved the greatest gain. The three treatment groups had higher mean gain scores than either the control or kindergarten group. Note that the gain scores means cannot be subtracted directly from the post-test means to yield pretest scores because different numbers of individuals were involved.

In order to determine whether there was an effect due to repeated testing using the same instrument, some children were excluded from the pretest. Subsequent analysis showed no retest effects. The fact that only about one half of the children were given the PPVT as a pretest was also the reason that the PPVT post-test scores were used as a covariate.

Table 23.1

PPVT Raw and Gain Score Means and Sample Sizes by Treatment and Sex

Measure	Sex	TV-HV-MC	TV-HV	TV Only	Control	K'garten	Total
Post-test Scores							
Mean ($\bar{x}$)	Male	61.4	59.2	53.8	55.5	58.0	57.9
Number (N)		16	27	12	18	42	115
Mean ($\bar{x}$)	Female	52.7	56.0	54.5	54.3	56.9	55.1
Number (N)		15	22	19	16	24	96

Table 23.1 (Continued)

Measure	Sex	TV-HV-MC	TV-HV	TV Only	Control	K'garten	Total
Mean ($\bar{x}$)	Total	57.2	57.8	54.3	54.9	57.6	56.7
Number (N)		31	49	31	34	66	211
Gain Scores							
Mean ($\bar{x}$)	Male	7.4	10.5	9.6	9.2	5.3	7.0
Number (N)		8	11	5	9	42	75
Mean ($\bar{x}$)	Female	7.2	8.9	14.3	4.3	6.4	8.0
Number (N)		8	15	7	6	19	55
Mean ($\bar{x}$)	Total	7.3	9.6	12.3	5.5	5.6	7.4
Number (N)		16	26	12	15	61	130

As indicated in Table 23.2, the PPVT raw score means from tests administered in June, 1971, as a post-test were significantly different ($p < .005$) from one another. The highest mean for a treatment group was 57.8 for the TV-HV, and the lowest was 54.3 for the TV only. However, a Dunnett's test for significance of differences between means failed to yield positive results at the .05 level. The differences related to sex were not significant (means of 57.9 for the males vs. 55.1 for the females), nor was the interaction between sex and treatment group significant. According to the η^2 in Table 23.2, 8.2 percent of the variance in PPVT raw scores was explained by differences attributable to treatment effects.

Table 23.2

Analysis of Variance of PPVT Post-test Raw Scores

Source	η^2**	d.f.	Mean Square	F	p
Trt. Groups*	.082	4	14105.62	4.69	.005
Sex	.001	1	791.77	.26	NS
Group x Sex	.022	4	3855.45	1.28	NS
Error		202	3007.51		

*Treatment groups are TV-HV-MC, TV-HV, TV only, control, and kindergarten.

**Eta square (η^2) is the proportion of variance accounted for by each source and is determined by dividing each sums of squares by the total sums of squares. A convenient reference is: Hays, William L., Statistics, Holt, Rinehart and Winston, 1963, p. 546-548.

(6)

Table 23.3

Analysis of Variance of PPVT Raw Score Gains

Source	r	d.f.	Mean Square	F	p
Trt. Groups	.068	4	272.68	2.32	NS
Sex	.000	1	0.89	0.76	NS
Group x Sex	.034	4	136.83	1.16	NS
Error		121	117.44		

The difference in mean gain scores among treatment groups and by sexes was not significant as indicated in Table 23.3. The fact that one group did not gain more in PPVT raw score than another was considered an indication that all groups were learning at about equal rates, and that the PPVT post-test was therefore an effective and appropriate instrument by which to adjust for initial differences among treatment groups.

PPVT IQ

The highest mean PPVT IQ achieved by any group was 112.2 for the TV-HV-MC males (Table 23.4). The lowest IQ was 92.9 for the females of the same treatment group. One group, the seven TV only girls, had a mean PPVT IQ gain of 14.8 points and the average gain for all groups was 6.2 points. The differences in PPVT IQ gain scores were not significant (Table 23.5). None of the programs changed the IQ as measured by the PPVT; none of them included that change in their objectives.

As with the PPVT raw scores, the differences in PPVT IQ scores were found to be significant when compared according to treatment groups. However, the Dunnett's post analysis of variance test again failed to discriminate between means.

Table 23.4

PPVT Post-test Total Sample Mean IQ Scores and Mean IQ Gain Scores on Partial Sample

Measure	Sex	TV-HV-MC	TV-HV	TV Only	Control	K'garten
Post Test $\bar{x}$	Male	112.2	107.1	101.2	100.5	104.4
$\bar{x}$	Female	92.9	102.4	98.9	98.3	102.9
$\bar{x}$	Total	102.9	105.0	99.8	99.5	103.8
Gain Scores						
$\bar{x}$	Male	1.9	10.0	5.8	7.2	5.1
$\bar{x}$	Female	-0.4	7.3	14.8	5.3	7.3
$\bar{x}$	Total	0.8	8.4	11.0	6.4	5.8

*Sample sizes are the same as reported in Table 23.1.

Table 23.5

Analysis of Variance of PPVT Post-test IQ Scores

Source	η^2	d.f.	Mean Square	F	p
Trt. Group	.083	4	46351.98	4.67	<.005
Sex	.002	1	4794.05	.48	
Group x Sex	.021	4	11739.86	1.18	
Error		201	9932.36		

Table 23.6

Analysis of Variance of PPVT IQ Gain Scores

Source	η^2	d.f.	Mean Square	F	p
Trt. Group	.051	4	492.10	1.68	NS
Sex	.000	1	15.30	0.52	NS
Group x Sex	.015	4	146.06	0.50	NS
Error			291.89		

Age

The children in the treatment groups used for this technical report were supposed to be at least 5 years of age as of September 30, and some difference in age was expected to exist among the groups. The age in months of the child at the time of post-testing (June, 1971) was entered as a variable and used as a covariate in later analyses.

According to Table 23.7 the oldest group was the TV-HV-MC and kindergarten children with a mean age in months of 73.2, and the youngest was the control group with a mean age of 71.1 months. These differences were not significant at the .05 level of confidence as shown in Table 23.8.

Table 23.7

Mean Age in Months at Time of Post-testing by Treatment Group

	TV-HV-MC	TV-HV	TV Only	Control	K'garten	Total
Mean ($\bar{x}$)	73.2	71.9	72.1	71.1	73.2	72.4
S.D.	5.0	4.7	5.9	4.4	3.7	4.6
N	31	49	31	34	66	211

Table 23.8

Analysis of Variance of Age in Months

Source	d.f.	S.S.	Mean Square	F	p
Between Groups	4	138.2	34.55	1.60	N.S.
Within Groups	206	4420.9	21.46		
Total	210	4559.1			

Socioeconomic Levels

As indicated in Table 23.9, the group with the highest economic and educational level was the control group with a Hollingshead Two Factor score of 3.47, and it was followed by the kindergarten group with a score

of 3.64. The least economically and educationally advantaged was the TV only group with a score of 4.27. However, none of these differences were found to be statistically significant (Table 23.10).

Table 23.9

Mean Hollingshead Two Factor Index Score by Treatment Groups

	TV-HV-MC	TV-HV	TV Only	Control	K'garten	Total
Score $\bar{x}$*	3.87	3.78	4.27	3.47	3.64	3.71
S.D.	.76	.67	.90	.86	.81	.91
N	23	9	11	30	53	126
% of total N	74.1	18.3	35.4	88.2	80.3	59.7

*Lower scores indicate higher educational and economic attainment.

Table 23.10

Analysis of Variance of Socioeconomic Data

Source	d.f.	S.S.	Mean Square	F	p
Between Groups	4	6.133	1.53	2.32	NS
Within Groups	121	80.001	0.66		
Total	125	86.134			

Analysis of Appalachia Preschool Test Results

An important criterion by which success of early childhood programs are judged is the level of achievement of cognitive objectives. This section reports the analysis of scores from the Appalachia Preschool Test, the AEL developed instrument designed to measure achievement of those cognitive objectives identified as important for Appalachia children through the preliminary needs study.

Appalachia Preschool Test, Part 2

Part 2 of the APT, as described in Technical Report No. 14, is a multiple choice subtest of 61 items and was designed to measure cognitive objectives taught during the first program year. Table 23.11 presents the pretest and post-test raw scores by sex for the five groups. The pretest scores are based on fewer individuals than the post-test scores because not all individuals were pretested.

Table 23.11

Post-test and Pretest Score Means for APT, Part 2 by Treatment and Sex*

Measure	Sex	TV-HV-MC	TV-HV	TV only	Control	Kindergarten
Post-test	$\bar{x}$ Male	48.7	43.7	36.7	34.3	41.5
	$\bar{x}$ Female	44.5	45.3	40.4	39.9	42.8
	$\bar{x}$ Total	46.6	44.4	39.0	36.8	42.0
Pretest	$\bar{x}$ Male	33.2	36.2	22.9	27.6	36.0
	$\bar{x}$ Female	32.3	32.0	28.1	33.3	31.6
	$\bar{x}$ Total	32.7	33.6	25.8	30.2	34.3

*Sample sizes are the same as reported in Table 23.1 except that post-test data for one control female was not available.

As for interpretation of the table, the TV-HV-MC males had a mean post-test score on the APT, Part 2, of 48.7 compared to a mean for the girls of 44.5. The mean for the total TV-HV-MC group was 46.6. The total group mean of 46.6 represented correct responses to 76 percent of the 61 items in Subtest 2.

When the post-test raw scores were adjusted according to differences in age in months and PPVT raw scores, the pattern of means shown in Table 23.12 emerged. The differences among means for the treatment groups were significant at the .005 level as indicated in Table 23.13, and the treatment group means are shown graphically in Figure 23.1.

Dunnett's tests were completed to determine which treatment group means were significantly greater than other means, and any difference of 4.4 between means was significant at the .05 level. Therefore, the TV-HV-MC group achieved significantly higher scores than the TV only, control, and kindergarten groups. The TV-HV group also achieved significantly higher scores than the TV only group. Other differences were not significant according to the Dunnett's test. The test indicated that girls in all groups combined achieved significantly higher scores than boys when differences in age and PPVT raw scores were used to adjust means.

Table 23.12

Adjusted Post-test Means for APT, Part 2 by Treatment Group and Sex*

Sex	TV-HV-MC	TV-HV	TV only	Control	K'garten	Total
M	45.7	42.1	38.3	35.1	40.5	40.5
F	46.7	45.8	40.0	41.4	42.5	43.2
Total	46.2	43.8	39.2	40.0	41.2	41.8

*See Table 23.1 for sample sizes.

Table 23.13

Analysis of Covariance of Post-test Raw Scores by Treatment and Sex for APT, Part 2

Source	η^2*	d.f.	Mean Square	F	p
Group	.094	4	359.48	5.41	<.005
Sex	.026	1	396.50	5.97	<.05
Group x Sex	.010	4	39.43	0.59	
Covs.		2	163374.00	2459	
Cov. 1		1	194.27	2.92	
Cov. 2		1	5026.88	75.7	
Error	.870	199	66.42		

*Eta^2 (η^2) is the particular source of variance (e.g., group) divided by the sum of the group, sex, group x sex, and error sums of squares.

The program implication from the analysis of scores on APT, Part 2, is that groups which received all components of AEL's program achieved higher scores than a control group, a group which only observed the television program, and a kindergarten group. The scores were from an instrument designed to measure the achievement of cognitive objectives considered important to 5-year-old children. The kindergarten group and two other treatment groups--TV-HV and TV only--failed to score significantly higher than the control group. Therefore, the important implication from the APT, Part 2, is that 5-year-old children in AEL's program reached more cognitive objectives than children in a kindergarten program.

(12)

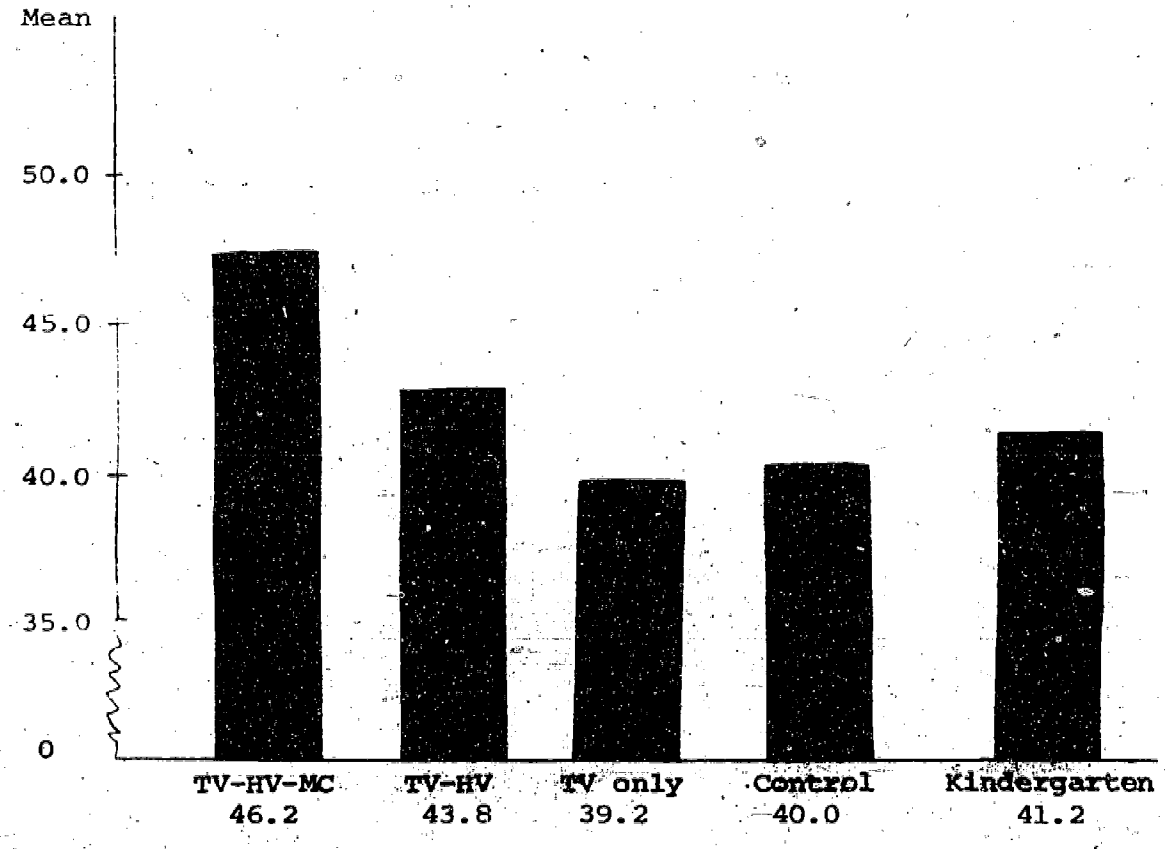

Figure 23.1

Adjusted Post-test Raw Score Means for
APT, Part 2 by Treatment Groups

Appalachia Preschool Test, Part 5

Part 5 of the APT was an 18-item subtest designed as a supplement to measure additional cognitive objectives. The raw score means are included as Table 23.14, and the pretest means are shown in the same table. All analyses, including analysis of variance of gain scores and of post-test raw scores, showed high levels of significance, but the most indicative analysis was that based on an analysis of covariance of post-test raw scores. The covariates again were age in months and PPVT raw scores.

Table 23.14

Post-test and Gain Score Means for APT, Part 5 by Treatment Group and Sex*

Measure	Sex	TV-HV-MC	TV-HV	TV only	Control	Kindergarten
Post-test	$\bar{x}$ Male	15.8	14.8	10.8	10.4	12.7
	$\bar{x}$ Female	14.3	18.3	15.0	11.9	13.2
	$\bar{x}$ Total	15.1	16.4	13.4	11.1	12.9
Pretest	$\bar{x}$ Male	10.1	11.1	8.1	9.2	10.5
	$\bar{x}$ Female	9.9	11.0	9.5	12.1	10.3
	$\bar{x}$ Total	10.0	11.0	8.9	10.5	10.4

*Sample sizes are the same as reported in Table 23.1.

The adjusted means are depicted in Table 23.15, and the analysis of covariance results is given in Table 23.16. The difference in treatment group means is shown in Figure 23.2. The group with the highest adjusted mean score was the TV-HV children with 16.1 of the 18 items, or 89.5 percent, answered correctly. The Dunnett's tests indicated that a difference in means of 3.0 was significant at the .05 level. Therefore, the TV-HV-MC, TV-HV, and TV only groups scored significantly higher than the control group, and the TV-HV group scored higher than the kindergarten group. Other differences were not significant. The order of means from highest to lowest was TV-HV, TV-HV-MC, TV only, kindergarten, and control. The girls in all groups again achieved higher scores than the boys.

The program implication again was that a group receiving the Appalachia Preschool Education Program achieved higher scores than the control and kindergarten groups. On this test of logical reasoning, sensory discrimination and labeling, and letter recognition, the kindergarten group did not achieve significantly higher scores than the control group. Children who received AEL's program reached more cognitive objectives than kindergarten children or children who received no treatment.

Table 23.15

Adjusted Post-test Means for APT, Part 5 by Treatment Group and Sex*

Sex	TV-HV-MC	TV-HV	TV only	Control	K'garten	Total
M	14.7	14.3	11.4	10.7	12.4	12.7
F	15.2	18.5	15.6	12.7	13.1	15.1
Total	14.9	16.1	13.9	11.6	12.6	13.8

*Sample sizes are given in Table 23.1.

Table 23.16

Analysis of Covariance of Post-test Raw Scores by Treatment Group and Sex for APT, Part 5

Source	η^2*	d.f.	Mean Square	F	p
Group	.079	4	141.52	4.54	.005
Sex	.034	1	247.52	7.95	<.005
Group x Sex	.012	4	32.90	1.06	
Covs.		2	18043.6	579	
Cov. 1		1	2.30	0.74	
Cov. 2		1	710.14	22.7	
Error	.875	199	31.15		

*Eta^2 (η^2) is the particular source of variance (e.g., group) divided by the sum of the group, sex, group x sex, and error sums of squares

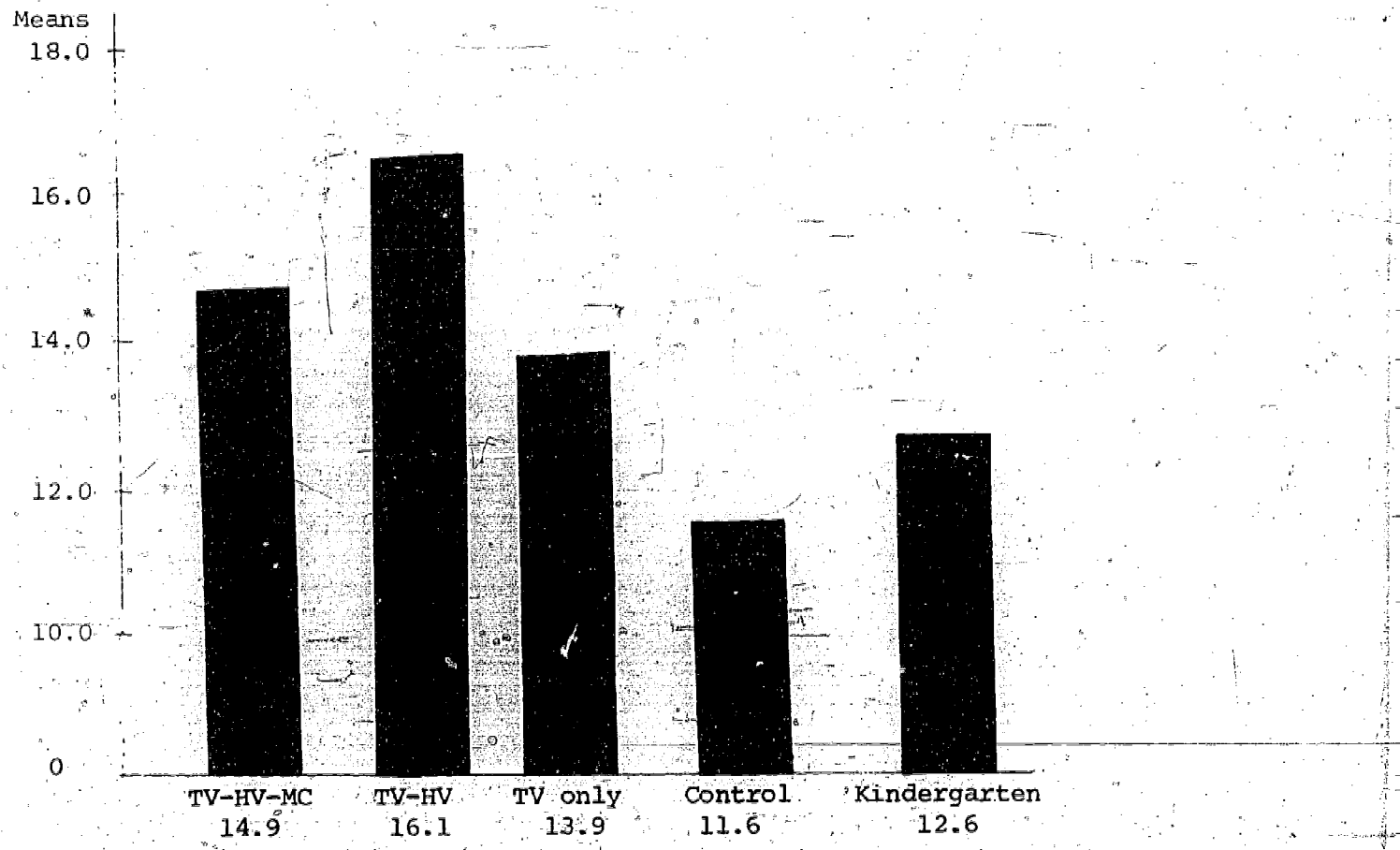

Figure 23.2

Adjusted Post-test Raw Score Means for APT, Part 5 by Treatment Groups

(15)

Appalachia Preschool Test, Part 6

Part 6 of the APT is similar to Part 2 discussed previously and also contains 61 items. It was designed to measure objectives taught during the third program year which were not adequately sampled by other parts of the APT.

The post-test raw score means are given in Table 23.17, and since this test was not used as a pretest, no pretest scores are presented. The analysis of variance of the post-test raw scores yielded highly significant results ($p < .005$), but the analysis of covariance table is reported since initial differences in age and intelligence were controlled.

Table 23.17

Post-test Mean Scores for APT, Part 6 by Treatment Group and Sex*

Measure	Sex	TV-HV-MC	TV-HV	TV only	Control	Kindergarten
Post-test	$\bar{x}$ Male	50.9	47.1	35.6	33.8	46.0
	$\bar{x}$ Female	47.5	47.6	44.1	40.8	47.7
	$\bar{x}$ Total	49.2	47.3	40.8	37.1	46.6

*Sample sizes are the same as reported in Table 23.1.

The adjusted means are given in Table 23.18, and other covariance data are given in Table 23.19. Figure 23.3 is a graph showing the differences in treatment group means.

Table 23.18

Adjusted Post-test Means for APT, Part 6 by Treatment Group and Sex*

Sex	TV-HV-MC	TV-HV	TV only	Control	K'garten	Total
M	48.0	45.6	37.2	34.6	45.0	43.1
F	50.0	48.1	45.6	43.5	47.4	47.0
Total	49.0	46.7	42.3	38.6	45.7	44.9

*See Table 23.1 for sample sizes.

Table 23.19

Analysis of Covariance of Post-test Raw Scores by Treatment Group and Sex for APT, Part 6

Source	η^2	d.f.	Mean Square	F	p
Group	.134	4	556.44	8.58	<.005
Sex	.060	1	1062.66	10.39	<.005
Group x Sex	.025	4	107.66	1.66	
Covs.		2	184955.00	2853	
Cov. 1		1	436.41	6.73	
Cov. 2		1	4818.90	74.3	
Error	.781	199	64.83		

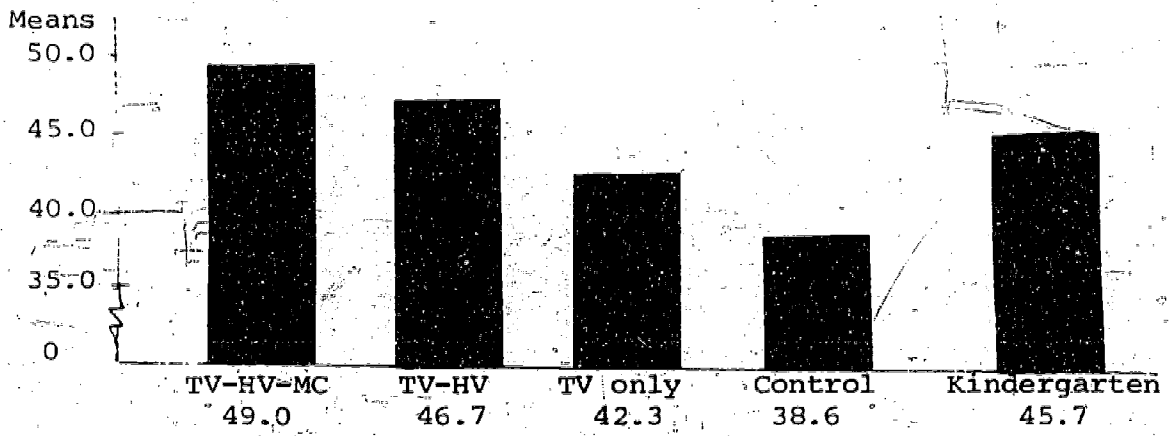

Figure 23.3

Adjusted Post-test Raw Score Means for APT, Part 6 by Treatment Groups

The order of treatment groups from highest mean to lowest mean was TV-HV-MC, TV-HV, kindergarten, TV only, and control. The Dunnett's analyses indicated that the TV-HV-MC and TV-HV groups achieved significantly higher mean scores than either the TV only or control groups, and the kindergarten group achieved significantly higher scores than the control group. The girls again achieved higher scores than the boys.

The program implication from the APT, Part 6, analyses was that 5-year-old children in AEL's Preschool Education Program again achieved significantly higher scores than a control group which did not have access to the television program, home visitors, or a mobile classroom and higher than a

group which had access to TV only. The kindergarten group also achieved a higher score than the control group. Although not statistically significant, the mean score for the TV-HV-MC group was again higher than the mean score for the kindergarten group.

Summary

The Appalachia Preschool Education Program developed by the Appalachia Educational Laboratory has been compared with a standard kindergarten program on the basis of achievement of objectives judged to be appropriate for 5-year-old children in Appalachia. The comparison was considered especially important by certain Appalachian school personnel since the AEL program was demonstrated to cost approximately half as much per year as a full day kindergarten program.

Initial differences in intelligence test scores were observed, so the PPVT raw scores and age in months were used as covariates in order to adjust scores on the test of achievement of cognitive objectives. The differences in economic and educational levels of the parents favored the control and kindergarten groups, but the differences were not statistically significant.

The group which received all components of AEL's Preschool Education Program achieved higher scores than a control group on all three parts of the test designed to measure achievement of cognitive objectives. The kindergarten group also achieved higher scores on one part of the test of cognitive objectives thought to measure most accurately the third year's programming effort. Children who received AEL's program achieved significantly higher scores than the kindergarten children on two of the three tests of cognitive objectives.

The girls in all treatment groups outscored the boys on most tests. Since the effect was observed in the control group as well as other treatment groups, the higher scores by girls could have been due to more rapid development patterns for girls or perhaps to the effect of greater expectations for girls.

The instruction of children by television, using a paraprofessional home visitor to counsel with parents and children, and providing opportunities for social interaction of children through experience on a mobile classroom did have an effect on the achievement of cognitive objectives by a randomly selected sample of 5-year-old children in rural Appalachia.

Program Implications

Program selection of AEL's Preschool Education Program as an alternative to other early childhood education programs depends partly on acceptance of the objectives which AEL's program was designed to reach. The list of objectives was too long to be included in this report and may be obtained from

AEL's Diffusion Department. The objectives derived through a survey of Appalachian children (Hooper and Marshall, 1968) were used as a pool from which to obtain objectives for AEL's preschool program. The Appalachia Preschool Test was designed to measure cognitive achievement of children in the program.

AEL's program was shown to reach the objectives measured by two subtests where other programs including the standard kindergarten program did not. Both the children in the kindergarten program and AEL's preschool program did reach more of the objectives than did a control group.

The achievement of these objectives implies that AEL's Preschool Education Program is an acceptable, if not preferred, alternative to other early childhood education programs.

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