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ABSTRACT

A study was done to see if a teacher-guided, sequentially-arranged program of instruction for kindergarten children used in addition to a regular classroom program is more effective in producing general intellectual gains and specified behavioral characteristics than two instructional alternatives. These alternatives were (1) participation in a regular kindergarten program or (2) participation in a special program of expressive activities (such as finger painting, block play) in addition to a regular kindergarten program. Subjects were 104 disadvantaged kindergarten children. Each instructional group had approximately 30 hours of actual contact time. The Stanford-Binet and the Peabody Picture Vocabulary Test (PPVT), were used to measure intellectual functioning, and experimental task situations were used to obtain measures of attention, visual retention, visual discrimination, task persistence, divergent uses, and classification. Results did not support theories on the advantages of sequential instruction or a special program of expressive activities in addition to the regular classroom program. Appendixes describe the programs and give test data for subjects. [Not available in hard copy due to marginal legibility of original document] (DR)

The Effect of Supplementary Small Group Experience on Task Orientation and Cognitive Performance in Kindergarten Children

Margaret Lay

1969

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The Effect of Supplementary Small Group Experience on Task Orientation and Cognitive Performance in Kindergarten Children

A Final Report of the Kindergarten
'Learning to Learn' Program Evaluation Project

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Introduction and Background

A major controversy in the early childhood field has been waged over the issue of whether optimal development occurs when a child is allowed to spontaneously interact with a prepared environment or whether pre-planned sequences of learning activities are preferable. Several recent studies (Blank, 1968 Day, 1968 DiLorenzo, 1968 Olsen Spear and Tomaro, 1969) seem to support the view that, at least for very specific goals carefully structured preplanned sequences are most effective. At least one study (Lenrow, 1968) and the opinions of many child development specialists hold that children's capacities for self-direction and/or creative abilities may not be fostered in the more highly structured and sequenced programs. Comparisons between sequentially-arranged teacher-guided programs and those primarily focusing on children's self-initiated activites are needed to provide further evidence. The general purpose of this study was to compare the effects of these alternative learning situations.

More specifically, the study was designed to evaluate the effectiveness of the sequential instruction component developed by Dr. Herbert Sprigle as part of his Learning to Learn model for early childhood education. Evaluations conducted by Van de Riet and Van deRiet (1966, 1967) of the Sprigle program established it as a promising approach worthy of further evaluation. In an initial study (Van de Riet and Van de Riet, 1966) three matched groups of "culturally deprived" Negro children were compared. An entire class group of 25 received the experimental program utilizing two classroom areas -- a work-play area in which the total classroom group engaged in a variety of activities and a smaller room used for work with groups of four or five children in a sequential program of guided learning

The children were taken from the regular classroom for daily short periods of participation in games and activites desigoed to get the child to become active in the learning process.' A second group received kindergarten training in an established traditional" kindergarten in the community and a third group had no formal trainin g. Children in the experimental program were found to be significantly superior to either the traditional kindergarten group or the no kindergarten group on developmental measures including Stanford-Binet· Human Figure Drawings· Peabody Picture Vocabulary Test· Bender Gestalt test· Metropolitan Readiness Test· Visual encoding, Verbal encoding, Auditory-vocal association, Visual-motor association subtest of the Illinois Test of Psycholinguistic Abilities. The 'traditional" trained group showed higher performance than the no-kindergarten group but the differences were not nearly as great as between the experimental and traditional" groups.

The Sprigle program was also experimentally used and evaluated for lower-middle class children. The results of both studies (reproduced from Sprigle, et.al., 1967) are presented in Table 1. It will be noted that the experimental program resulted in greater improvement for culturally-deprived children than for the lower-middle class children. At the termination of a nine-month program the culturally-deprived experimental children were functioning at levels similar to those of the lower-middle class children exposed to 'traditional' kindergarten programs.

Although the Learning to Learn program in toto has been demonstrated to make an impressive difference in children's development especially culturally-deprived children, there remain unanswered many questions as to the factors most contributory to these gains. The highly-structured sequential tasks used in the experimental program were assumed to be the major contributing factors. Van de Riet and Van de Riet (1966). however, also noted the high level of investment and teaching competence of the author/director of the experimental program. The issue of teacher involvement must be accounted for by further evidence.

A third possibility also seems to warrant investigation. The evaluators did not determine to what degree the program of general classroom activities (beyond the special games and activities used as part of the guided-learning sequences) were different from those of the traditional classroom. Observers this writer, reported a richness of materials and opportunities for unstructured interaction and exploration quite distinctive from most 'traditional" settings. Since all children in the experimental

TABLE 1

COMPARISONS OF CULTURALLY DISADVANTAGED AND
LOWER-MIDDLE CLASS CHILDREN AT THE COMPLETION OF KINDERGARTEN

Variables		Lng. to Ln. Mean	Trad. Program Mean	No Program Mean
Binet Intelligence Scores	Disadv.	104.12	90.33	83.29
	Low MC	112.83	107.33	
Binet Vocabulary	Disadv.	5.62	3.71	2.71
	Low MC	7.00	6.19	
Bender-Gestalt (error score)	Disadv.	11.96	15.46	17.33
	Low MC	7.91	11.48	
Metropolitan Readiness-Total	Disadv.	66.46	44.71	40.79
	Low MC	66.78	47.38	
School Readiness Screening Test	Disadv.	20.08	13.79	13.21
	Low MC	24.65	22.24	
Sequin Form Board (time score)	Disadv.	23.46	31.46	33.08
	Low MC	21.26	21.62	
Rail Walking (error score)	Disadv.	10.92	31.83	28.21
	Low MC	10.78	16.48	
Human Figure Drawings	Disadv.	16.33	10.04	7.08
	Low MC	20.09	14.52	

Note. Reproduced from the publication A Fresh Approach to Early Childhood Education and a Study of Its Effectiveness, a report submitted to the Carnegie Corporation of New York, by Herbert Sprigle and Joan Sprigle, Directors and Developers of the Program, and Vernon Van de Riet and Hani Van de Riet, Directors of the Evaluation Study. 1967.

program had similar exposure to the general classroom and the special instructional sequences in small groups the question arises as to whether the success of the program could be attributed to richness of general classroom program rather than to the sequential learning experiences per se. The study described in this report included design conditions to allow separate analysis of these program features.

A fourth possibility, although less likely to account for developmental gains, is that simply being taken from the classroom in small groups and receiving "extra attention" is a significant experience in itself. Although Blank (1967) did not find gains on Stanford-Binet scores for two subjects in a small pilot study who simply received individual attention outside the classroom, other such comparisons have not been reported and the possibility cannot be dismissed. The present study provided a "placebo" situation to explore these effects.

OBJECTIVE OF THE STUDY

The objective of this study was to determine whether a teacher-guided, sequentially-arranged program of instruction for kindergarten children used in addition to a regular classroom program is more effective in producing general intellectual gains and specified behavioral characteristics than two instructional alternatives. These alternatives were (1) participation in a regular kindergarten program or (2) participation in a special program of expressive activities in addition to a regular kindergarten program. Assessment of subjects' performance on standard developmental measures and in a range of selected discrete situations were obtained and used to determine differences between groups assigned to the above-mentioned alternative instructional situations.

Definitions

Sequential instruction - For the experimental "teacher-guided sequentially-arranged program of instruction" children were taken from the regular classroom in groups of four to seven to participate in a pre-arranged sequence of activities under a teacher's direction. These sessions of approximately twenty minutes duration were conducted in a separate small room. These groups are hereafter referred to as Sequential groups. (For more complete descriptions of the sequential instruction series, see Appendix A.)

Expressive activities - The placebo program of "expressive activities" consisted of approximately twenty minutes of daily participation by children in groups of four to seven in activities such as easel painting, finger painting, puppet play, block play, experimentation with musical instruments,

clay work, etc. These sessions were also conducted in the small room apart from the regular classroom Since the function of the Expressive activity was to provide a placebo situation of similar duration, personnel, group size as the sequential instruction condition, the teachers were instructed to use the products of the children's activities as a focus for conversation but to avoid directing those activities to produce specific cognitive attainment. Most of the materials used in the Expressive program were also available in the regular classrooms. The Expressive situation was designed to neither substantially add to nor detract from the experience of the regular classroom program while providing the same dimensions in regard to teacher-child ratio and physical setting as the sequential treatment. (For more complete descriptions of the sequential instruction series, see Appendix B.)

METHOD

Subjects

The subjects of this study were kindergarten children enrolled in an inner city Syracuse public school. Children from six kindergarten classes at Dr. Martin Luther King, Jr. Elementary School provided a pool of 116 subjects. All of these initial enrollees in each of the six kindergarten classes were randomly assigned to one of the instructional conditions. Twelve moved from the school district during the year leaving a total of 104.

Six subjects were white the remaining black. There were 56 girls and 48 boys. Ages ranged from 4 years, 9 months to 6 years, 6 months at the beginning of the study in September, 1968. All were enrolled in the kindergarten for the first time although three were over age the age range for the remainder of the group was from 4 years, 9 months to 5 years, 9 months. Although no measure of socio-economic status was used, the population would generally be described as low economically and "culturally disadvantaged" according to the usual criteria. The mean intelligence, according to Stanford-Binet scores obtained from 95 of the original group was 86. Analysis of initial IQ testing indicated that there were not significant differences between groups according to classroom, session, or instructional condition.

Procedure

The manipulation of the program for experimental purposes consisted of providing additional experiences for some sub-groups beyond the base classroom experience from the period beginning October 7, 1968 through

May 30, 1969. There were three treatment conditions designated as Sequential, Expressive, and Control.

Sequential subjects were taken from the regular classroom for approximately twenty minute daily periods (with the usual excentions of days when there were special all-school events, etc.) to participate in a teacher-guided sequentially-arranged instructional program. Expressive subjects were also taken from the regular classroom for approximately twenty minute daily periods but participated in various expressive activities with a minimum of teacher direction and no preplanned use of materials to effect particular cognitive attainments or approaches to learning. Each of these instructional groups had approximately one hundred sessions, comprising thirty or more hours of actual contact time. Control subjects had only the regular classroom experience.

The sessions for the Sequential and Expressive groups were conducted by professionally-qualified half-time teachers not otherwise involved in the regular classroom programs. Each of these teachers was responsible for Sequential Instructional Programs for approximately 20 children, five to seven from each of the three classroom groups during either the morning or the afternoon session and similarly for the Expressive Activities for approximately 20 children. The sequential children for which each of these teachers was responsible were regrouped across class lines to more closely approximate desirable homogeneous instructional levels but only four to seven children were in session at any one time. Similar regroupings of Expressive subjects were also effected to maintain similarity of treatment.

Table 2 presents the subject distribution for both the original group and the groups after attrition.

As noted previously one of the half-time teachers was assigned to the morning session, the other the afternoon. They were responsible, therefore, for working with both the Sequential and Expressive instructional conditions. The rationale behind this strategy was, of course, that the likelihood of teacher differences affecting results would be lessened if the same individuals were involved with the two treatment conditions. There existed the possibility that the teachers might favor one of the approaches over the other and that these attitudes might influence teaching behavior. Concerted efforts were made to emphasize to the special teachers, however, that it was expected that significant contributions to children's development would accrue from both of the special programs. It was stressed throughout the study that both approaches were expected to make positive, although perhaps different, contributions.

To summarize, the design of the study enabled comparison of groups of kindergarten children who had experienced either a regular school program plus sequential instruction, a regular school program plus expressive activities program, or only the regular school program. These have been designated as the Sequential, Expressive, and Control instructional conditions. The three separate base classrooms can also be compared as well as differences between morning and afternoon sessions. The latter condition includes the primary influence of a different special teacher for each but also obviously includes time difference and class composition. The main and/or interaction effects of Instructional Condition, Classroom, and Session were examined through analysis of variance techniques.

Evaluation Instruments

The Stanford-Binet Intelligence Scale and the Peabody Picture Vocabulary Test were the standard measures employed in this study to obtain a general assessment of intellectual functioning. Non-standard experimental task situations were used to obtain measures of attention, visual retention, visual discrimination, task persistance, divergent uses, classification. These are described in the following sections.

Attention, Visual Retention, Visual Discrimination. Three separate scores for each subject - attention, visual retention, and visual discrimination - were derived from the use of a task situation in which the subject examined a two-dimensional form displayed at the bottom of a small box and subsequently selected an identical arrangement from an array of choice forms.

Twelve boxes were constructed from poster board in 1' x 1' x 1' dimensions (without tops). Stimulus forms randomly selected from the Thurstone Identical Forms Test were pasted at the bottoms of the boxes. For each of the twelve boxes the matching array of choice forms from the Thurstone tests were centered on 3' x 5' sheets of black construction paper.

The examiner showed the first small box to the subject and said, "We are going to play a game with some boxes. There is a little picture in this box. Take a look at the picture. You can take the box in your hands if you like. You can look at the picture for as long as you wish." When the child stopped looking the examiner removed the box to her own hand out of the child's visual access and immediately presented the choice card. "Now take a look at these. Do you know which of these is just the same as the one in the box? Which one looks just like the one in the box?"

When the child indicated one of the forms, the original box was redisplayed and the examiner said, "Were you right? Is that just the same as the one in the box?" If the child responded that his initial choice had

TABLE 2

SUBJECT DISTRIBUTION BETWEEN
CLASSROOM, SESSION, AND INSTRUCTIONAL CONDITION

Classroom & Session		Instructional Condition		
		Sequential	Expressive	Control
Classroom A	AM	7 - 6	7 - 7	6 - 4
	PM	6 - 5	7 - 7	6 - 6
Classroom B	AM	6 - 6	7 - 7	7 - 7
	PM	6 - 5	6 - 5	6 - 6
Classroom C	AM	6 - 6	6 - 6	6 - 6
	PM	7 - 6	7 - 6	7 - 5

Note. The first number indicates the original Ns for each of the conditions the second number indicates the N after attrition.

not been correct, the examiner said, Which one is exactly the same as the one in the box?"

For the first two of the twelve boxes, incorrect responses were discussed and the child was shown the matching form, if necessary, and told why it was correct and the others wrong. No record was made of the child's performance for the first two trials. For the remaining ten boxes the child's response was accepted without correction even though in error.

From this series of interchanges between examiner and subject an observer seated nearby (within three feet of S) recorded three scores for each of the ten box presentations. First, a record was made of the length of time the child actually spent looking (eyes directed toward) at the box. The ten time measures were later averaged to obtain one score described for the purposes of this study as an attention score. Second, the choice the child made when the stimulus form was out of sight was recorded as a visual retention measure. The total number of correct responses comprised the visual retention score. Third, the child's choice when the stimulus form was again in view was also recorded for each of the ten boxes and the total number of correct responses comprised the visual discrimination score.

Task Persistance. A felt-covered board was placed on the surface of a table at which subjects were seated. Six 4" x 6" felt rectangles of varying colors were prepared, as follows: one was used in the original whole state, a second was cut into two 4" x 3" pieces, a third was cut diagonally into two pieces, a fourth was cut diagonally with one of the sections again cut diagonally to form three triangular pieces, a fifth cut into eight irregularly shaped sections, and a sixth cut into two 2" x 6" pieces.

The whole rectangle was held out by the E and placed on the felt board directly in front of the child. The two 4" x 3" pieces were then presented and the E said, "We are going to play a game with shapes. We are going to try to put these pieces together on top of this shape so that they are just the same as this one. I would like you to try to put these pieces on top of this shape so that it is all covered." If necessary, the E demonstrated how the pieces could be placed on top of the original rectangle and then removed them again inviting the child to try it. Each of the partitioned rectangles were then presented to the child in turn and a record was made of the child's persistance in attempting to solve the puzzle of how to assemble the pieces. If the child stopped working or verbally indicated that he didn't wish to continue, the E completed the rectangle, removed the pieces and presented the next puzzle. If he persisted for four minutes in trying to solve a puzzle, the E said, "You worked very hard on that one,

didn't you? Let me help." The E would then complete the puzzle and present the last one.

(Note: Initially the fifth puzzle had been constructed to be unsolvable. The examiners, however, found it so disconcerting to watch a child work at a puzzle that they knew had no solution that they were allowed to substitute the possible, although extremely difficult, eight-sectioned rectangle. Since it proved quite difficult for a series of adults and was not solved by any of the children in pilot work, it was therefore used with the sample children. Much to the consternation of the Es, however, a few children in the study did solve this puzzle. This will be further discussed in the Results section.)

Divergent Uses. The equipment included a 3" tan Steiff teddy bear and a large supply of blue paper party cups (1" in diameter and 3/4" deep).

The examiner placed the teddy bear on the table in front of the child and said, "Would you like to play with this little teddy bear? Go ahead - you can play with it. Here is a paper cup to play with also. What can you think of to do with the bear and the cup?" After a one minute period the E said, "You did a lot of things with the bear and the cup. Let me take that cup now and I'll give you a new cup. Can you think of something else to do with this cup that you haven't done before?" When the child manuevered the cup and/or the bear in some way the E said, "What is the bear doing with the cup?" or "Tell me what is happening." Upon receiving a reply or after a brief pause the E said, "Now, let me take that cup and give you another one. Can you think of something different to do with this cup that you haven't tried before?"

As each cup was removed it was placed with the other used ones in a row at the back of the table. If a child repeated the same action and/or description, the E said, "I think you did that before. Can you think of something different to do?" If the child then indicated "no" or did not respond, the E took the cup and presented a new one as if an additional action had been performed. The cups were presented continuously to the child as rapidly as his responses allowed during the three minute period.

An observer seated within three feet of the child recorded the actions and significant words of the child during the one minute and three minute periods. Actions such as the following were listed on a duplicated sheet and required only a check - sits on cup, sits in cup, sits beside cup (cup up), sits beside cup (cup down), sits with back to cup, puts cup on head, etc. Other actions and verbal description were recorded in writing by

the observer. Although most actions during the first minute period were motor manipulations and during the second three minute period included verbal descriptions this was not always the case and indications were made in the record when there were exceptions.

Two scores were derived for each child from the record sheets. First a count was made of the total number of different actions the child produced with the bear and the cup = including both those that were motor manipulation only, and those which were verbal description as well as motor manipulation. This total was termed Divergent Uses-Total.

A second score was derived from the numerical weighting of each response according to a scaling of items. In a pilot study involving twenty subjects it was found that responses could be justifiably scaled according to the following criteria: Level 1 responses - Bear is placed in varying positions in relation to the cup, i.e. puts Bear's feet in cup, places cup on Bear's paw; S gives Bear a motor experience with cup, i.e., has Bear walk or jump over cup; Bear uses cup as a usual food container, i.e., "eats out of it," "drinks milk." Level 2 responses - Cup is used as a common container other than a food container, i.e. bath tub, bed, sink, toilet, chair, bucket; Cup is used as a more unusual container, i.e., "fry some chicken in it," "cook a snake," "get in it and splash some water," "dig up snow and put it in it." Level 3 responses - Cup is used as an unusual non-food container or as a non-container object, i.e., pool, garbage can, boat, car, cabinet, door, TV, stop sign.

In the scoring process each item was assigned to a level and assigned a corresponding 1, 2 or 3 value. These values were summed for all items to comprise a Divergent Uses-Weighted score. Correlations between Divergent-Uses-Weighted scores assigned by two independent raters from the protocols of twenty randomly selected subjects was determined to be 97.

Classification. The classification tasks used for this study were adapted from those described by Charlesworth (1968). In the present study, the subject was presented with an array of 21 objects arranged on a low table. After a brief period (approximately 30 seconds) he was shown an additional stimulus object which was placed in a shallow box on a chair at his side. The subject was asked to pick out all the things that "go with" "belong with," or "are like" the object. He was allowed to choose as many objects as he wished to place in the box with the stimulus object. If he stopped prior to choosing four, however, the tester asked, "Is there

anything else that would go with the - - -?"

The E recorded each choice (through the first five) in order and any spontaneous comments the child made which seemed relevant to the reason for his choice.

After the series of selections had been made the chosen objects were returned to the array and the tester presented the child with a new stimulus object, again asking him to pick out all the things that "go with" the object. Five separate presentations were made and the choices recorded for each of the following stimulus objects - red crayons, orange fruit, yellow cone-shaped party hat, man, yellow and green milk carton. In a final sixth request the E said, "This time I'm not going to show you anything at all. I'm just going to say a word. Food. Pick out all the things you think go with food."

The objects in the array were an orange pen, a cone-shaped popcorn container, orange fruit, red apple, ice cream cone, banana, toy baby bottle, toy red fireman's hat, reddish-orange ball, red candle. yellow pencil, red crayon, yellow and green model of an apartment building (cylindrical), toy beige cowboy hat, orange-covered matches, green and white-covered matches, orange toy umbrella, miniature rubber cow, miniature rubber boy, girl and woman.

Rating of the classification responses was completed subsequent to the testing periods from the record sheets. Two ratings were made according to the extent to which logical thinking was used in making choices. One rating was made of overall use of organizational principles; a second was made of consistencies of choice patterns. The following definitions were followed in making these evaluations: Organizational principles - If all of the selections chosen were seen to be the product of logical reasoning, 2 points were assigned. Different principles might be included in the same grouping however, i.e., with red crayons there might be red objects, objects that write, long thin objects, etc. If the grouping had at least one of the choices which appeared to result from logical reasoning, 1 point was assigned. Choice patterns - If all objects in a grouping were seen to fit one principle, 3 points were assigned. If all objects in a grouping were seen to fit some logical principle in relation to another object in that grouping (although perhaps not in regard to the stimulus object, i.e., for red crayon - red apple, red candle, green matches) 2 points were awarded. If at least one choice was seen as related to the stimulus object although other choices were related to neither stimulus object or previous choices

1 point was awarded.

Two scores were thus obtained for the classification task. One was for Classification-Organizational Principles· the second for Classification--Choice Patterns. The highest possible score for the first was 12· for the second, 18.

Reliability comparisons were made between scores assigned by independent raters for twenty randomly selected records. The percentage of agreement for each of the six presentations according to organizational principle were crayon, 100%; orange, 100%· party hat, 95· man, 100% carton, 90%· food, 95%. The choice pattern ratings were in agreement, as follows crayon, 95%; orange, 100%; party hat, 100%; man, 95%; carton, 80%; food, 95%.

Testing Schedules, Personnel, and Procedures

Pre-testing on the Stanford-Binet took place from September 14 to October 5, 1968 prior to the initiation of the program. Scores for some subjects were available from testing done during the previous summer from a study conducted with Head Start participants. In cases where multiple scores had been obtained from these subjects the most recent was used.

All post-testing was accomplished between May 15 and June 17. This included the Stanford-Binet, Peabody Picture Vocabulary Tests and the six non-standard measures. The administration of the Stanford-Binets, both pre and post-testing, was done by qualified non-project personnel from Syracuse University. These examiners had no or very little knowledge of the nature of the study and no knowledge of the treatment assignments of subjects. They had no particular schedule for testing and followed their own inclinations for order of taking children from clasrooms. None systematically took children from the same classrooms throughout their testing periods.

The bulk of the remainder of the testing was done by the two half-time teachers who had worked throughout the program and, hence, were very familiar with the conditions of instruction used in the study. They, however, did testing during the opposite session than the one during which they had been teaching and so had almost no knowledge of those children or the groups to which they had been assigned. The few children who were known were identified prior to the testing and they were therefore examined by an additional outside person who worked on a short term basis testing those children and a group of other children. The testing was thus conducted on a "blind" basis.

Since rather extensive testing had to be accomplished in relatively brief periods of time there were some instances for each kind of testing in which children were absent or inadvertently missed. There was no systematic bias to those omissions and since completely eliminating those subjects

because of an item (or items) of missing data would have reduced already low Ns to a point of suspected distortions, all scores obtained were used and Ns are therefore reported for each separate analysis in the results section. The complete data listing for each subject are included in Appendix C for the reader's perusal.

RESULTS

Stanford-Binet Intelligence Scales

The Stanford-Binet scores for both pre- and post-assessment were obtained from 94 of the 104 subjects of the study.[1] The mean quotient and standard deviation for this group during pre-testing in September, 1968 was 85.94 and 11.75, respectively. For post-testing the overall mean was 89.23 and the standard deviation was 13.20. (The means and standard deviations for each of the respective subgroups for this and the succeeding measures are contained in Appendix D.)

The analysis of variance is summarized in Table 3. No main effect differences were found. There were, however, significant interaction effects ($p < .05$; df 2,76) for Treatment and Session and a triple interaction for Instructional Condition, Classroom and Session ($p < .01$; df 4,76). An examination of the means and standard deviations revealed opposite patterns for morning sessions than for afternoon sessions in regard to effectiveness of instructional condition. For the morning sessions the sequential group showed the greatest gains in intelligence quotient scores[2] (M= 38.06· S.D. = 10.03) with expressive (M = 34.56· S.D. = 13.92) and control (M =35.18· S. D. = 7.80) quite comparable.

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1 Three children were found to be untestable at the beginning of the school year and their post-tests are therefore not included in analysis of change scores. Their group and treatment assignments and their post-scores were as follows:

Subject A	Expressive/Classroom C/AM	60
Subject B	Control/Classroom C/PM	58
Subject C	Expressive/Classroom B/PM	78

2 The Stanford-Binet change scores were converted to a positive number scale for which the point of "no change" was at the numeral 32. The figures cited as means and standard deviations in this section are based on this positive number scale. Thus, the mean of 38.06 reported represents a gain of 6.06 points· 34.56 represents a 2.56 gain· 35.18 represents a 3.18 gain; etc.

This pattern was reversed for afternoon sessions where control subjects showed greatest gains (M = 38.92; S.D. = 10.81) and sequential least (M = 32.07; S.D. = 9.90). The afternoon expressive group (M = 35; S.D. = 10.90) was quite comparable to the morning group. When anovas were done on a post hoc basis for each session separately, however, no significant effects were found for instructional conditions, classrooms, or interactions for either session.

The triple interaction effects of Instructional Condition, Classroom, and Session were further investigated through the use of Multiple Range Tests adapted from Duncan's procedures for application to group means with unequal numbers of replications (Kramer, 1956). These findings are reported in Table 4.

TABLE 3

ANALYSIS OF VARIANCE FOR CHANGE IN SCORES FROM PRE-TESTING TO POST-TESTING ON STANFORD-BINETS

Source	df	MS	F
Instructional condition (A)	2	12.56	
Classroom (b)	2	2.04	
Session (c)	1	1.07	
A x B	4	5.85	
A x C	2	32.40	4.59*
B x C	2	11.37	
A x B x C	4	97.21	13.764**
Within	76	7.06	

*p <.05
**p <.01

TABLE 4

MULTIPLE RANGE TESTS FOR DIFFERENCES BETWEEN MEANS ON STANFORD-BINET CHANGE SCORES

Instructional Condition --	Seq	Expr	Expr	Expr	Seq	Seq	Seq	Expr	Con	Con	Con	Seq	Seq	Con	Con	Expr	Seq	Expr
Classroom --	B	B	C	A	A	C	C	B	C	A	B	A	C	A	B	C	B	A
Session --	PM	AM	PM	PM	AM	PM	PM	PM	PM	AM	AM	PM	PM	PM	PM	PM	AM	AM
Group Mean	28.80	28.83	29.00	29.50	31.80	32.00	34.50	34.50	34.50	35.00	35.86	38.50	39.00	39.00	40.33	42.00	42.33	43.42
28.80		.03	.20	.70	3.00	3.20	5.70	5.70	5.70	6.20	7.06	9.70	10.20	10.20	11.53	13.20	13.53	14.62
28.83			.17	.67	2.97	3.17	5.67	5.67	5.67	6.17	7.03	9.67	10.17	10.17	11.50	13.17	13.50	14.59
29.00				.50	2.80	3.00	5.50	5.50	5.50	6.00	6.86	9.50	10.00	10.00	11.33	13.00	13.33	14.42
29.50					2.30	2.50	5.00	5.00	5.00	5.50	6.36	9.00	9.50	9.50	10.83	12.50	12.83	13.92
31.80						.20	2.70	2.70	2.70	3.20	4.06	6.70	7.20	7.20	8.53	10.20	10.53	11.62
32.00							2.50	2.50	2.50	3.00	3.86	6.50	7.00	7.00	8.33	10.00	10.33	11.42
34.50								--	--	.50	1.36	4.00	4.50	4.50	5.83	7.50	7.83	8.92
34.50									--	.50	1.36	4.00	4.50	4.50	5.83	7.50	7.83	8.92
34.50										.50	1.36	4.00	4.50	4.50	5.83	7.50	7.83	8.92
35.00											.86	3.50	4.00	4.00	5.33	7.00	7.33	8.42
35.86												2.64	3.14	3.14	4.47	6.14	6.47	7.56
38.50													.50	.50	1.83	3.50	3.83	4.92
39.00															1.33	3.00	3.33	4.42
39.00															1.33	3.00	3.33	4.42
40.33																1.67	2.00	3.09
42.00																	.33	1.42
42.33																		1.09
43.42																		

Means underlined by the same line are not significantly different.

Peabody Picture Vocabulary Test

The Peabody Picture Vocabulary Test was administered to 103 of the 104 subjects. Raw scores were used in the analysis rather than quotients. The mean for the total group was 47.12 and the standard deviation was 9.42. The results of the analysis of variance are in Table 5. The analysis revealed no significant main effects or interaction effects.

Attention

The measure of attention was obtained from 102 subjects. The mean attention scores for the total group was 5.52 seconds with a standard deviation of 4.38. The analysis of variance is summarized in Table 6. There were no significant findings.

Visual Retention

The visual retention scores from the 102 subjects tested had an overall mean of 4.5 and a standard deviation of 1.94. The results of the analysis of variance are summarized in Table 7. It will be noted that significant differences ($F=6.07$ df 1 84 $p<.05$) were found between sessions but not for the other main variables or for interactions. Although t-tests confirmed that the scores of children attending afternoon sessions were significantly superior to those attending morning sessions ($t=2.88$ df 99 $p<.01$), further sub-analyses revealed that while expressive and Control afternoon subjects were significantly superior ($t=2.16$ df 34 $p<.05$; $t=2.01$ df 31 $p<.05$, respectively) to their morning counterparts there were not significant differences between the Sequential groups in regard to session. When separate anovas were done for each session independently in additional post hoc analysis, no significant effects were found for instructional condition, classroom or interactions.

Visual Discrimination

The visual discrimination scores from the 102 subjects ranged from 1 to 10 with a mean of 7.59 and a standard deviation of 1.92. Table 8 summarizes the analysis of variance findings for the visual discrimination measure. The only significant F was for the triple interaction effect of instructional condition classroom and session. The multiple range tests of significant differences between cells (Kramer, 1956) are presented in Table 9.

TABLE 5

ANALYSIS OF VARIANCE FOR SCORES ON PEABODY PICTURE VOCABULARY TESTS

SOURCE	df	MS	F
Instructional condition (A)	2	10.52	
Classroom (B)	2	4.66	
Session (C)	1	7.88	
A x B	4	3.81	
A x C	2	15.77	
B x C	2	13.85	
A x B x C	4	37.15	
Within	83	15.26	

TABLE 6

ANALYSIS OF VARIANCE FOR ATTENTION SCORES

Source	df	MS	F
Instructional condition (A)	2	1.40	
Classroom (B)	2	1.68	
Session (c)	1	19.91	
A x B	4	4.56	
A x C	2	2.95	
B x C	2	1.51	
A x B x C	4	27.98	
Within	84	37.29	

TABLE 7

ANALYSIS OF VARIANCE FOR VISUAL RETENTION SCORES

Source	df	MS	F
Instructional condition (A)	2	.06	
Classroom (B)	2	.94	
Session (C)	1	6.00	6.07*
A x B	4	.50	
A x C	2	.44	
B x C	2	.28	
A x B x C	4	1.37	
Within	84	.99	

*p<.05

TABLE 8

ANALYSIS OF VARIANCE FOR VISUAL DISCRIMINATION SCORES

Source	df	MS	F
Instructional condition (A)	2	.14	
Classroom (B)	2	.81	
Session (c)	1	.71	
A x B	4	1.06	
A x C	2	1.29	
B x C	2	1.37	
A x B x C	4	2.51	3.29*
Within	84	.76	

*p<.05

TABLE 9

MULTIPLE RANGE TESTS FOR DIFFERENCES BETWEEN MEANS ON DISCRIMINATION SCORES

Instructional Condition / Classroom Session	Expr A AM	Seq C PM	Con C AM	Con A AM	Con C PM	Seq A AM	Con B PM	Expr A PM	Seq A PM	Seq B AM	Seq B PM	Seq C AM	Expr C PM	Expr C AM	Expr B PM	Con B PM	Expr B AM	Con A PM
	6.14	6.33	6.50	6.75	7.00	7.17	7.29	7.43	7.50	7.83	8.00	8.17	8.17	8.20	8.20	8.67	8.67	9.00
6.14		.19	.36	.61	.86	1.03	1.15	1.29	1.36	1.69	1.86	2.03	2.03	2.06	2.06	2.53	2.53	2.86
6.33			.17	.42	.67	.84	.94	1.10	1.17	1.50	1.67	1.84	1.84	1.87	1.87	2.34	2.34	2.66
6.50				.25	.50	.67	.79	.93	1.00	1.33	1.50	1.67	1.67	1.70	1.70	2.17	2.17	2.50
6.75					.25	.32	.54	.68	.75	1.08	1.25	1.42	1.42	1.45	1.45	2.12	2.12	2.25
7.00						.17	.29	.43	.50	.83	1.00	1.17	1.17	1.20	1.20	1.67	1.67	2.00
7.17							.12	.26	.33	.66	.83	1.00	1.00	1.03	1.03	1.50	1.50	1.83
7.29								.14	.21	.54	.71	.88	.88	.91	.91	1.38	1.38	1.71
7.43									.07	.40	.57	.74	.74	.77	.77	1.24	1.24	1.57
7.50										.33	.50	.67	.67	.70	.70	1.17	1.17	1.50
7.83											.17	.34	.34	.37	.37	.84	.84	1.17
8.00												.17	.17	.20	.20	.67	.67	1.00
8.17													--	.03	.03	.50	.50	.83
8.17														.03	.03	.50	.50	.83
8.20															--	.47	.47	.80
8.20																.47	.47	.80
8.67																	--	.33
8.67																		.33
9.00																		

Means underlined by the same line are not significantly different.

Task Persistance

Task persistance scores were obtained from 100 subjects. The range was from 15 to the ceiling level of 240[3] with an overall mean of 141.26 seconds. The standard deviation for the total group was 76.15. The analysis of variance results are presented in Table 10. There were no significant findings.

Divergent Uses: Total

The total scores for individual subjects on the Divergent Uses task ranged from 1 to 22. The overall mean was 12.75 and the standard deviation 4.57 for the 100 subjects tested. The summarization of the analysis of variance may be seen in Table 11. Significant differences will be noted between sessions ($F=4.57$; df 1.82 $p<.05$). Although t-tests of difference between means confirmed that subjects in the afternoon session performed significantly better than the morning groups ($t=2.36$; df 98; $p<.05$) further sub-analyses established that significant differences in sessions could be substantiated for only the expressive groups ($t=2.04$; df 32; $p<.05$). The differences between morning and afternoon control groups ($t=1.94$; df 31) or sequential groups ($t=.55$; df 31) fell short of the $p<.05$ level of confidence When separate anovas were done for each session independently in additional post hoc analysis, no significant effects were found for instructional condition, classroom or interactions.

Divergent Uses: Weighted

When the responses on the Divergent Uses Tasks were weighted according to the scaling values described in the Evaluation Instruments section, the range for the total groups was from 1 to 28 with a mean of 16.79 and a standard deviation of 6.94. The results of the analysis of variance are contained in Table 12. No significant effects were found on this dimension.

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[3] Three subjects successfully completed the most difficult of the rectangle puzzles. Their scores were recorded at the highest persistance level - 240 - although they finished in less than that time in each case.

TABLE 10

ANALYSIS OF VARIANCE FOR TASK PERSISTANCE SCORES

SOURCE		df	MS	F
Instructional condition	(A)	2	1397.45	
Classroom	(B)	2	1917.90	
Session	(C)	1	5626.48	
A x B		4	1252.07	
A x C		2	183.01	
B x C		2	1319.10	
A x B x C		4	462.66	
Within		82	4504.07	

TABLE 11

ANALYSIS OF VARIANCE FOR TOTAL SCORES ON DIVERGENT USES

SOURCE		df	MS	F
Instructional Condition	(A)	2	7.12	
Classroom	(B)	2	3.12	
Session	(C)	1	21.91	4.57*
A x B		4	9.99	
A x C		2	4.50	
B x C		2	12.33	
A x B x C		4	.75	
Within		82	4.79	

TABLE 12

ANALYSIS OF VARIANCE FOR WEIGHTED SCORES ON DIVERGENT USES TASKS

SOURCE		df	MS	F
Instructional Condition	(A)	2	20.23	
Classroom	(B)	2	13.72	
Session	(C)	1	40.25	
A x B		4	13.17	
A x C		2	4.86	
B x C		2	8.85	
A x B x C		4	1.76	
Within		82	10.39	

Classification Principle

The classification task when scored according to the degree to which logical principles were used yielded scores ranging from 4 to 17 with a mean of 9.16 and a standard deviation of 2.40 for the total sample of 101 subjects tested. The analysis of variance presented in Table 13 indicates that there was a significant main effect ($F=7.92$; df 1,83; $p<.01$) for session. There were no other significant findings. Further analysis confirmed that children attending afternoon sessions performed significantly better at the classification task than the morning attending children ($t=3.05$; df 99 $p<.01$). Cross-comparisons according to respective instructional conditions, however, showed only control groups with significant differences between sessions ($t=3.05$; df 31 $p<.01$). The differences between morning and afternoon groups were not significant for either the sequential or expressive instructional condition groups. When anovas were done on a post hoc basis for each session separately, no significant effects were found for instructional conditions, classrooms, or interactions for either session.

Classification Pattern

When the classification task responses were rescored according to choice patterns as described in the Evaluation Instrument section, the mean became 12.26 and the standard deviation 3.74. The analysis of variance results are in Table 14. It will be noted that the differences between sessions are significant ($F=8.37$; df 1,83; $p<.01$). Again, as in the case with classification-principle findings, only the afternoon control groups were significantly superior to their morning counterparts ($t=3.36$; df 21; $p<.01$). Significant differences were not found through the use of t-tests between sessions for either sequential or expressive groups and anovas done on each session separately in a post hoc analysis showed no effects of instructional condition, classroom or interactions.

TABLE 13

ANALYSIS OF VARIANCE FOR CLASSIFICATION TASKS SCORED FOR USE OF PRINCIPLES

SOURCE		df	MS	F
Instructional Condition	(A)	2	1.49	
Classroom	(B)	2	.51	
Session	(C)	1	9.63	7.92*
A x B		4	.87	
A x C		2	1.16	
B x C		2	.67	
A x B x C		4	1.25	
Within		83	1.22	

* P. 01

TABLE 14

ANALYSIS OF VARIANCE FOR CLASSIFICATION TASKS SCORED FOR CHOICE PATTERN

SOURCE		df	MS	F
Instructional Condition	(A)	2	3.40	
Classroom	(B)	2	.51	
Session	(C)	1	24.59	8.37*
A x B		4	1.94	
A x C		2	4.46	
B x C		2	2.29	
A x B x C		4	1.74	
Within			2.94	

* P. 01

SUMMARY AND CONCLUSIONS

The design utilized in this study enabled comparisons between groups of kindergarten children who had experienced either a regular school program plus sequential instruction, a regular school program plus an expressive activities program, or only the regular school program. Comparisons were also made between the three base classrooms involved in the study and between sessions.

The findings may be summarized as follows. There were no significant differences found on the Peabody Picture Vocabulary Tests or the measures of attention, task persistance, or divergent uses-weighted. Differences between sessions were noted for divergent uses-total, classification-principle, classification-pattern, and retention. The afternoon groups were found to be superior in each of these instances. In sub-analyses, however, it was found that sequential groups did not differ significantly between sessions on any of these dimensions. The overall differences stemmed primarily from control and expressive groups. In fact, only the afternoon control groups were significantly superior to the morning control groups on the two measures of classification while it was only the expressive groups who had significant differences between sessions on the divergent uses-total measure. Both expressive and control groups showed significant differences between session in the visual retention analyses. It is only possible to speculate on findings in regard to session differences. Since the differences were noted primarily for control groups and to a lesser extent, expressive groups, the behavior and the characteristics of the special teachers assigned to the instructional conditions according to session do not seem to be a prime factor. These special teachers had no contact with control subjects. Explanations must be sought, it would seem, in factors such as group composition, time of day. Although observations of classrooms were not included in the original proposal and planning of this study, some assessments were made of individual child encounters in the classrooms during the school year and are in the process of analysis. Further explanations may possibly be forthcoming from this data and, if so, will be made available upon completion.

Interaction effects between instructional condition and session were found on Stanford-Binet change scores with morning sequentials ranking high while for the afternoon groups, sequentials were low and controls high. Triple interactions of instructional condition, classrooms, and sessions were also noted for this measure. The use of multiple range tests between differences in means for sub-groups revealed no patterns which would support conclusions about the effectiveness of any particular combinations of conditions.

Although triple interactions of instructional condition, classroom, and session were also noted for the discrimination measure, the multiple range test of differences in means again was not helpful in delineating the comparative influence of any of the various sets of conditions. The findings in regard to these triple interactions are indeed ambiguous.

There were no other results which would give direction to assessing the effectiveness of the programs utilized in this study. In summary then, the findings of this study gave virtually no support to the advantages of sequential instruction or a special program of expressive activities in addition to the regular classroom program.

Since these findings are quite discrepant with the conclusions of prior studies it is necessary to consider why such might be the case. One conclusion might be that other components of the Sprigle programs may have been contributing more to the children's development than is generally recognized. Although efforts were made in this study to enrich all of the base classroom situations through increased attention to providing stimulation via activities and equipment throughout the school year, there was no effort to coordinate the special sequential instruction with the classroom nor to duplicate the base classroom environment of the Learning to Learn School. It seems possible that the base classroom situation at the Sprigle centers, or other phases of the program such as parental involvement, have made a major contribution to the substantial gains reported in previous studies.

A second possible explanation might be that the program of sequential instruction utilized in this study was not sufficiently comparable to the Sprigle instruction. Whether this is the case can be determined by further comparisons of the descriptions included in the Appendices of this report with the delineations of the Learning to Learn approaches as these become available.

It further seems reasonable to speculate that the deep involvement of the authors of the Learning to Learn program at the experimental stages may have been, as suggested by Van de Riet (1966), a major contributing factor to its success. The results of other current and future replications will be necessary to assess this dimension.

The question posed by this study, of whether twenty-minute daily programs of sequential instruction or expressive activities lead to significant improvement of performance on selected relevant tasks by young disadvantaged children, must be answered in the negative. There was no clearcut evidence to support the advantage of this kind of instruction.

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APPENDIX A

SEQUENTIAL INSTRUCTION PROGRAM

The sequentially-arranged curriculum used in this study was divided into three phases designated as motor, language arts, and space and number. There was considerable overlap between them, however, and each encompassed more than the signle designation would indicate. For example, the first phase was considered a motor phase largely because each curricula portion centered around a motor activity. Built into the motor activity, however, was intentional exposure to vocabulary, problem-solving, discrimination, matching, comparisons, etc.

In the intial introduction to each activity the children only heard the words and concepts as modeled by the teacher in relation to their motor activity. In the following lessons the new concepts and words were included in relation to more complex versions of the same kind of motor activity or with new activities with increased expectation for comprehension and usage. Considerable exposure was provided prior to expectation for mastery.

Concepts, vocabulary, experiences were carefully arranged within each phase and across phases to provide a logical sequence of increasingly complex and abstract learning activities.

A detailed explanation of the motor phase follows and briefer descriptions of the language arts and space and number phases are at the conclusion of this section.

Motor Activities - Phase I

MOTOR ACTIVITY #1

Name: Step-in Boxes

Materials: cardboard construction of ajoining open-topped forms (boxes) ranging in height from 5" to 24" providing a nine-unit matrix of height/width variation

Activity:

Children were given turns to walk through the boxes. They were encouraged to vary their way of doing this, i.e., going all the way, stopping and going backward, going sideward. They were asked to copy patterns set by the teacher and by the other children.

The teacher made a point of providing vocabulary to match the observations of the cardboard construction and the physical activity it stimulated. The vocabulary intentionally modeled included high-er-est, low-er-est, forward, backward, turn around, first, second, third row, middle row, last row, stop, begin, easy, hard, same, different.

The teacher asked for observations such as, "Did John go all the way through? Did Deedee do it the way Michael did? Can you think of another way to do it?

Performance criteria:

Does the child walk through the boxes without difficulty (to a reasonable height for him)?

Can the child follow a pattern set by another which has one variation in it? Two variations?

MOTOR ACTIVITY #2

Name: Tunnels

Materials Tube-like encasings of varying diameters - 4 to 36 , at least one of which is approximately four feet in length

Activity:

Children were invited to crawl through larger tunnels (36 and 24 diameter) and their relative size was discussed. The children were then asked whether they thought they could go through other specifically-designated tunnels. They were then asked to try and were later re-asked about some of the more questionable ones after being presented with several others.

For the ones that were too small for them to crawl through, they were asked if someone, maybe at home (baby) could crawl through. For the smallest 4" tunnels, they were asked, "Can anyone crawl through? Could your head go in? Could a baby? Do you know an animal that could?, etc.

The children were encouraged to vary their way of going through (backing in, going in forward and reversing to back out, etc. They were also asked to copy patterns set by the other children.

Performance criteria:

Can the child predict which of the series of tunnels he can successfully crawl through prior to trying?

Can the child follow a pattern set by another which has at least two separate actions?

MOTOR ACTIVITY #3

Name: Stepping Stones

Materials: Twenty-four linoleum blocks or other 8" x 8" sheets: 3 of each primary color and matching paper pieces for attaching to the shoes of participants.

Activity:

Two colors of the tiles were initially arranged across the floor as indicated-

red red red red

yellow yellow yellow yellow

The child was asked to match the papers with the tiles. These colored papers were then attached to the children's feet, with red on one foot and yellow on the other. They were asked to walk on the tiles - matching their foot color to the tile color. Other children were asked to watch to make sure that the walkers matched colors appropriately. Variations of color and task were added - removing red and replacing it with blue, random additions of a third color for distraction, reversing the direction of walking along trail, etc.

Upon completion of the activities the children were engaged in sorting the tiles into color piles for storage. Throughout the lesson the teacher intentionally modeled the color names.

Performance criteria:

Can the child match color to tile in walking along the trail?

Can the child identify when another has erred?

Can child sort colors in stacking tiles?

MOTOR ACTIVITY #4

Name: Walking Board

Materials: Walking board - commercially available

Activity:

The children were invited to walk along the board in any way they wished. The teacher described what she saw them doing with terms such as all the way, half-way, almost half-way, forward, backward, sideways, turning, standing on one foot, jumping off, big steps, little steps, tip toe.

Individual children were asked to do a "walk" while all watched. The teacher copied this walk and then invited the other children to see if they could copy it also. Other children were then asked to do a special walk for someone to copy. Spectators were asked, "Can you tell in words what Timmy did? Did Brad do it exactly the way Timmy did?"

Performance criteria:

Can the child walk both forward and backward on rail upon request?

Can the child follow two distinct activities as modeled by another?

Can the child label another person's activity as going forward, backward, halfway, all the way, as like another's, as different from another's?

MOTOR ACTIVITY #5

Name: Arches

Materials: Building blocks - including some long, slim variety, i.e., 2" x 3" x 24".

Activity:

The teacher constructed a large (24" high and 24" wide) and small (8" high and 18" wide) arch. The children were invited to try to climb under or crawl under each as they wished. These arches were then removed, a new set of differing sized constructed, and a child asked what he would like to do with it. If necessary the teacher said, "Would you try to go over or under?" Before allowing the child to try the teacher asked another child, "What do you think will happen when Jimmy tries to go over (or under) this arch?" The child was then allowed to try and then to build a new arch for someone else to do.

Performance cirteria:

Can the child predict whether he can successfully crawl under or over arch?

Can child often predict whether another child will be able to do what he has stated he will do?

Can child indicate which of two arches is high or low? Can he state whether another child went over or under?

Can the child arrange blocks to construct either a high or low arch upon request?

MOTOR ACTIVITY #6

name: Color Floor Trail

Materials: Floor covering of brown wrapping paper (or any large sheets) - 8' x 10' with color lines (red, yellow, blue) leading from one end of the paper to the other. One color trail leads directly from one end of the paper to the other; another trail should be curved; a third, zigzagged. all trails, however, should have the same beginning and ending point. At the further end of the paper were placed several rubber zoo animals (Creative Playthings) in constructed barred cages (shoe boxes) which were gaily and attractively decorated.

Performance criteria:

The children were told they were pretending to have a trip to the zoo. The difference between this pretend zoo and a real zoo were discussed, the animals examined, named, discussed. The children were told that there were roads or trails that went to the zoo, that they could either walk on a red trail, a yellow trail, or a blue trail. Each child was then asked which trail he would walk on and invited to try to see if he could follow the same color all the way. The color names were told the children by the teacher or other children where necessary. The teacher used terms straight, corners, around, turn, etc. as the children walked their chosen trails.

The children were asked which trail would be the shortest, which they would take if they were in a hurry, etc. When they had difficulty telling which was shortest, the teacher helped children to walk each taking steps together to see which got there first, string was put along both and compared after removal, etc.

The group was asked if they thought anyone could tell which trail they were walking on if they were blindfolded. Volunteers were blindfolded, led along the trail by the teacher, and then asked to identify the trail they had been taken along. The other children were asked to observe and confirm or correct answer.

Performance criteria:

Can the child follow trail even though it may intersect with another color at several points?

Can child tell whether he has gone on the straight, zigzagged, curved trail when blindfolded - by pointing or telling color?

ACTIVITY #7

Name: Fishing

Materials: 6-10" cardboard fish painted with red, blue, black tempera paints with large eye hole (2" in diameter); Tinker Toys, linked tubing or other adjustable lengths of rod-like materials to make poles of several lengths.

The fish were arranged at various distances from a tape mark along the floor indicating the shore line. The fish were propped up from the floor at one end with small blocks to make the center holes accessible for spearing with the poles.

Activity:

Each child in turn was given a 12" pole length and asked if he could "catch" any of three fish (red, blue, or black) placed at increasing distance from shore line or whether he should wait to receive another piece for his pole. At each receiving of pole pieces the child was asked to state whether he would try for a fish and, if so, what color, or whether he would wait. The other children commented on his choice, whether he would be successful in reaching the fish he wished to catch, etc. The teacher replenished the supply of fish in the pond, offered an additional pole piece at each child's turn, commented upon the number of fish caught by color designation, totals, length of poles, etc.

At the completion of the fishing activity the children helped to sort fish for storage according to color.

Performance criteria:

Can child usually predict whether pole will reach designated fish?

Can child correctly label fish caught by color?

Can child indicate which fish are alike? Different? Whether pole is longer? Shorter?

ACTIVITY #8

Name: Floor amp (from start line to buildings)

Materials: Models of three buildings - house, school, store; lengths of rope and wooden dowels cut to three lengths (2", 3", 4"). The buildings are placed on the floor at predetermined distances (to match dowels) from a tape-marked start line. Tinker Toy pieces.

Activity:

The children were asked to sit at the start line. After discussing the building models they were given, in turn, one of the rope pieces (later dowels) and were asked to predict whether same would reach from the start line to make a road to any of the buildings. They were then invited to try to see if the piece reached all the way or was "just the same." After several presentations to some of the children of each length individually, all three of the lengths were presented simultaneously and they were asked to decide which of three they would choose to make a road to reach the school, etc. The teacher used the words near(er), far(ther), long (er, est), short(er, est)repeatedly in relation to the activity.

Tinker Toy pieces were introduced and children invited to construct roads to "just fit." When the children had difficulty in forming exact lengths the teacher handed them the precut dowel pieces and asked if they would be useful in figuring how long to make the Tinker Toy road.

Performance criteria:

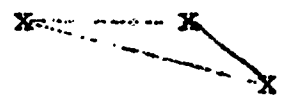
Can the child predict within a foot or so which of sticks will reach to specified building?

Can the child recognize when length of Tinker Toy will ont fit without trying each time against criterion piece of doweling while building same length?

ACTIVITY #9

Name: Floor Map - Building to Building

Materials: The building models used in Activity #8 were placed in triangular format at predetermined distances from each other. Two of the buildings were placed at 1' from each other; the other at a point in opposition to the others, in format such as the following -



Activity:

As in Activity #3 - except that estimates and constructions were made for spaces between buildings rather than from Start Line to buildings. Children remained behind the Start Line, however, while making these judgments.

Performance criteria:

Same as #8.

MOTOR ACTIVITY #10

Name: Floor Trails - Forms

Materials: As in Activity #6, floor covering of brown wrapping paper (or any large sheets) - 8' x 10' on which were pasted small geometric shapes to form a trail of squares, a trail of triangles, a trail of circles. These trails were arranged to begin at the same point at one end of the paper and were arranged on intersecting paths to be terminated at the point on the other side of the paper. One of the trails was straight; one zigzagged; one curved - as in Activity #6. The store model used in previous activities was placed at the termination of the trails. A model of each form was also placed on a card - 3" x 5".

Activity:

The teacher told the children that they were going to take a pretend trip to a store. A child was then shown one of the geometric forms on a card and he was asked to find the trail made up of those shapes. He was asked to follow the trail using the shape he was given on the card. They were invited to tell what they would buy if it were really a store at the completion of each trip.

The teacher discussed the similarities and differences in the trails, the time it took to go on each trail, etc. and repeatedly referred to squares, circles, triangles as she talked to the children about their activity.

Volunteers were blindfolded and led along a trail which they were later asked to identify by indicating which of the displayed forms (on cards) they thought made up the trail they had walked.

Performance criteria:

Can the child follow the trail even though it intersects with another?

Can the child distinguish between curved and straight trails when blindfolded?

MOTOR ACTIVITY #11

Name: Fitting Objects to Encasings

Materials: Balls, model cars, model buildings, toy people in graduated sizes with cardboard encasings (open on one end) to exactly fit each object; one additional toy with cardboard encasing.

Activity:

The teacher demonstrated how a toy can be put into its matching box describing how it is "not too big" or "not too little" but "just right." She then displayed the three frames which fit the balls, held up the large ball and asked the children which box would be "just right" for it. A child was invited to place the ball in the casing, another to tell whether it was "just right." The ball was then removed, a smaller one presented in a similar manner.

The boxes were then removed and only one reintroduced while all three balls were displayed. The teacher asked for predictions as to which ball would just fit the boxes. A child was invited to try, etc. The same general procedures were followed for each group of objects and their encasings. Children were later given the complete set of objects and matching boxes simultaneously and asked to fit the objects to the boxes.

Performance criteria:

Can the child predict which frame will be correct for given objects prior to trying them out?

MOTOR ACTIVITY #12

Name: Seriation of Encasings: Seriation of Objects Without Encasings

Materials: Same as activity #11

Activity:

The teacher presented a set of encasings and asked a child to place in order - first, beside each other and, second, nested inside each other. Each of the previously used sets of encasings was presented so that each child had opportunity to arrange and nest.

The encasings were next removed and the sets of objects presented one at a time. The teacher displayed all of the balls in mixed order, selected the smallest and asked a child which of the remainder he would place next to it. The other groups were similarly introduced.

The teacher repeatedly used the terms next, large(er, est), small (er,est), middle-sized, etc. in relation to the activity.

Performance criteria:

Can the child order the objects according to size?

Is the child beginning to use terms such as small, smaller, large, largest, etc.?

MOTOR ACTIVITY #13

Name: Pattern Copying I

Materials: Small plastic or wooden blocks of various sizes and colors (red, yellow, blue, green)

Activity:

The children were invited to play with the blocks for a period of time. They were then asked to return the blocks to the central pile.

The teacher modeled a simple pattern and the children were asked to exactly copy the pattern. Increasingly complex patterns of varying color and shape were used. The teacher used terms such as rows, over, under, next to, in back of, green, blue, square, tirangle, etc. in relation to the activity.

Performance criteria:

Can the child copy a model with variation of two forms and two colors in simple arrangement?

MOTOR ACTIVITY #14

Name: Pattern Copying II

Materials: Same as #13

Activity:

The activity was similar to #13 except that the teacher constructed rather difficult patterns for children to copy and soon transferred the model-making to individual children. She then copied the child's model asking for advice from the other children such as, "What piece do I need here? Let's see - can I use this red rectangle piece anyplace?" The teacher followed whatever verbal directions were given by a child whether correct or not and asked the advising child if it were right. When a child responded with vague general advice, i.e., put it over there or by pointing the teacher supplied words, i.e., "Oh, do you mean put it on top of the green square piece?"

Performance criteria:

Can the child copy a model with variation of two forms and two colors in simple arrangement?

Can the child give any verbal directions to another constructing a model?

MOTOR ACTIVITY #15

Name: Floor Map to Forms

Materials: Cardboard forms (triangle, circle, rectangle, square) were arranged on a large paper at varying distances from each other. Lines were painted on the paper between the forms. Doweling was cut to match each of these lines.

Activity:

The children were seated around the edges of the paper and the teacher initially discussed and identified the forms by name (when the children could not). The children were then asked, one at a time, to move their finger along the path from a specified form to another. The teacher indicated the form by pointing as well as by name whenever it seemed necessary.

The dowels were displayed and the children asked to predict which piece would just fit between the triangle and the circle, the rectangle and the triangle, etc. When necessary a child was asked to stand on (or point to) a form and another to indicate the other form to help a child in attending to the specified task. The lengths were then tried and, if not correct, another choice was made and tried.

Tinker Toy pieces were introduced and were joined to form leggths to fit between forms.

Throughout the activity the teacher used terms such as circle, square, rectangle, triangle, long(er, est), short (er, est), not long enough, too long, too short, etc.

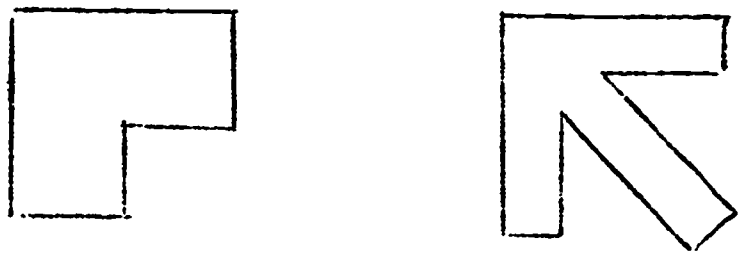
Performance criteria:

Can the child predict which length of doweling will reach from one form to another?

MOTOR ACTIVITY #16

Name: Seriation of Objects - 2 and 3-Way Classification

Materials: Several sets of objects (cars, toy furniture, buildings, people, etc.) in graduated sizes and runners out from cardboard to form indicators for separation of classes. The runners would be arranged as follows.



Activity:

The teacher displayed the placement indicators described above and discussed the paths. She then showed sets of objects (in mixed order) and asked a child to choose the largest in each group. These objects, if correct, were placed next to each other at the top left hand corner. A child was next asked to place one of the middle-sized objects and the procedure continued until both groups were placed in appropriate classification rows and in seriated order. They were then removed, remixed, and present all at once to children for correct replacement.

Other sets were also mixed and presented for classification according to kind of object and size. Three sets of objects were finally presented simultaneously in mixed order and a child was asked to arrange them along three paths starting with larger first; later, with smaller first, in reverse order.

Performance criteria:

Can the child arrange the objects correctly into a three-way classification and in appropriate seriation?

Is the child using terms such as small(er, est), large(er, est), etc.?

MOTOR ACTIVITY #17

Name Pattern Copying III

Materials Same as #13 and #14 brown paper bag large enough to hold a variety of blocks

Activity:

The teacher created a model pattern and the children in turn, were invited to reach into the bag and pull out one block. They then had to decide (1) whether they needed that particular block to copy the model or, if not, (2) whether they could give it to another child who did need it or (3) whether they would need to put it back and wait for another turn. Emphasis was placed on finidhing the model and then on helping others finish - not on being first or winning.

Performance criteria:

Can the child determine whether a pulled block is needed to complete an unfinished design?

MOTOR ACTIVITY #10

Name: Form Game I

Materials: Felt board or flannel board 4 sets of squares, triangles circles, rectangles (a set consisting of a red, yellow, blue, green, black version of each form).

Activity:

The teacher placed the felt board so that it could be easily seen by the children while they were sitting in a circle. All four sets of forms were placed in the center of the circle of children. The teacher talked with the children about the names of the colors as she spreads them out, mixing forms and color, i.e. Here is a red square, and here is a yellow circle. This is a yellow square." etc.

When all are displayed the teacher said, We are going to sort these out in a special way. I'll start by putting this on the board (chooses a red square) and then this one (a red triangle). Can you find other shapes that are the same color to put on the board with these?" The teacher frequently asked, Why did you choose this one?" and, if necessary, "Did you choose it because they are both red? What is the same about all of these?"

The same procedure was followed for each of the five colors. The focus was then changed to shape. The squares, circles, etc. were placed on the felt board together regardless of color.

Finally, all of the forms were arranged in matrix format with similarity in color forming one dimension and shape the other. Intentional errors in placement were made by the teacher to determine children's perception of the placement criterion.

Performance criteria:

Can the child match color ignoring form differences and similarities?

Can the child refer to the colors by name?

Can the child match form ignoring color differences and similarities?

Can the child spot errors in placement in the two-way classification in the matrix arrangement?

MOTOR ACTIVITY #19

Name Metal Frames

Materials: Templates of basic forms with insertions

Activity

The children were first invited to match each frame with its correct insertion. Several experiences of sorting out the frames and insertions provided opportunity for use of appropriate labeling of the forms by the teacher. The insertions were then placed in a row at the far side of the room from the children and teachers. The teacher then showed the children a single frame and asked a child to walk to the array on the other side of the room and choose the correct insert. Upon his return his choice was tried to determine its correctness, etc.

Performance criteria:

Can the child choose the correct form for insertion into a frame through visual inspection?

Can the child sufficiently remember the characteristics of a form to allow appropriate choice after a delay of several seconds?

MOTOR ACTIVITY #20

Name: Form Game II

Materials: Playing boards, actually form boards, each of a different color, constructed from 8" x 12" cardboards from which have been cut the forms children have had contact with in previous activities; matching color sets of inserts for each of the boards; brown paper bag

Activity:

The children were each given a playing board which they placed on the floor in front of themselves. The colored forms were placed in a paper bag and the bag within reach in the center of the circle of children.

The children were reminded of the previous activity using the forms and felt board. The teacher said, "Today we are going to play a game with shapes and colors a different way. Each of you has a cardboard with shapes cut out of it. We call these playing boards. What color is your playing board, Randy? What color is yours, Betsy?" Randy, you begin by pulling one shape from the bag. What is it? What color is it? Who has a playing board that color? Can you put it where it belongs on John's playing board, Randy?" "Betsy, you can pull a shape out next. What color is it? Does it belong on your playing board? Whose playing board does it belong on? Play continued until all boards were completed.

Performance criteria:

Can children tell names of the colors used?

Can child determine where on board a shape goes through visual inspection?

Can child match color of form to appropriate form board?

MOTOR ACTIVITY #21

Name: Bean Bag Game

Materials: Twelve bean bags; a large box from which has been cut a circle, a triangle, a square of approximate area of 40-60 sq. inches. Each of the squares cut into the box were outlined with varying colors to emphasize the form and to add an additional dimension for description. (At a later time additional smaller shapes were cut from the same box surface and outlined in contrasting colors to larger forms.)

Activity:

The teacher discussed the shapes and colors with the children. The children were then invited to toss beanbags into the box and the teacher commented with the throws which shape and color the child had aimed for and hit. The children were asked questions such as, "Who can throw a bean bag into the red triangle from way back here?" "Which one shall I try for, Sarah?"

At a later time when additional smaller holes had been cut into the box the teacher used the same general procedures. Children were then asked questions such as, "Can you throw the beanbag into the small red square? The large blue trinangle? Where did yours go? Which one are you going to try for?"

Performance criteria:

Can the child specify which target he will try to hit?

Can the child come close to hitting a target he specifies?

MOTOR ACTIVITY #22

Name: Template Activity

Materials: Masonite templates for each child for each of the following forms - circle, plus sign, square, triangle

Activity:

For each of the forms the teacher showed the children how to hold the frame and draw with a pencil or crayon inside the form. She discussed with them the characteristics of the form they were making. (Examples - the circle has no corners, no change in direction - just go on around; plus sign has two lines so you have to pick up your pencil.) For emphasis of difference between each form strips of yarn were arranged on the flannel board to form the shape also.

The teacher later gave the children blank newsprint sheets and crayons or pencil and asked them to copy the same displayed form. If they had difficulty she had them use the template for additional practice before trying again.

As a final activity in regard to each of these forms the teacher exhibited a form, removed it from sight, and asked the children to make it on their paper. They were also requested to make a square, etc. without first surveying a model.

Performance criteria:

Can the child copy the forms?

Can the child reproduce the forms from memory?

Can the child make the forms upon verbal request?

Language Arts Curriculum - Phase II

The second phase of instruction closely followed Dr. Herbert Springle's manuscript, Teacher's Guide for Language Arts, which had been submitted to Science Research Associates for commercial development and which was provided to the project by Editor Nora McMillan.

The series primarily involved experiences, discussion, related games centering around units on the human body, clothing, fruits, vegetables, meats, furniture, animals-farm and zoo, and transportation. The suggested procedures, in most instances, outlined a progression from contact with real instances, i.e., mirrored reflections of human body, children's own clothing, real fruit, etc. to model representations to two-dimensional graphics, to line drawings.

The major emphases were on labeling instances and categories, familarity with descriptive attributes, recognition with reduced cues, i.e., tactile cues only, line drawings only, etc. Most of the units culminated with a game in which a turn of a spinner indicated to the child player which pictured object he could take from a central array to play on a playing board. The child was in each of these instances expected to name the object, tell its "family classification" and place it on his playing board in the appropriate area for its category, i.e., zoo animals belonged in the pictured zoo and not on the pictured farm.

Since the materials obtained from Science Research Associates were in preparation for commercial distribution in the fall of 1968, they can no doubt be obtained directly from them or from Dr. Herbert Sprigle. They have therefore not been appended here.

Space and Number Curriculum - Phase III

The final phase of instruction followed the teacher's guide prepared by Dr. Herbert Sprigle (1967) for the use of Inquisitive Games TM, Exploring Number and Space. The contents of two Science Research Associates commercial kits were used, the suggested order of the prescribed games and activities followed, and the procedures closely adhered to. Only in the case of some of the early activities which duplicated some of the Motor Phase activities were omissions made in regard to specific games. The extensive listing of suggested related activities in the Teacher's Guide were used minimally at the descretion of each teacher who took into account the suitability for the particular children involved and the total amount of time for instructional activities. Although some of the sequential subjects completed the Space and Number series and all were at some point in this sequence at the termination of the program, not all finished all of this series.

APPENDIX B

60/61-

Expressive Activities Program

For the expressive activities program the teacher provided materials and, when necessary, established procedures for acceptable use of materials, i.e., "Put the thing you have away before choosing another."; "Ask him if you can play with the thing he chose." The teacher did not suggest specific uses of materials, but encouraged children's discussion and participation through conversationally showing interest and approval. The children were told initially that they would come to the room each day to "learn to use their own good ideas."

Materials such as the following were available on a rotating basis. At the beginning of the term only one or a few were presented at any session. Later several, as many as nine, were simultaneously available.

(1) Finger painting; finger paint paper; smocks; rack; etc.

(2) Crayon pieces, assorted colors and sizes; Manila paper

(3) Easels; tempera paints; brushes; newsprint sheets; racks; smocks; etc.

(4) Rhythm band instruments - triangles, tone blocks, tom-toms, etc.; record player; records

(5) Wooden and plastic blocks, small assorted shapes

(6) Paste; Manila paper; colored construction or metallic papers cut into various shapes

(7) Felt pens; newsprint

(8) Small blocks of scrap wood, variously shaped; Elmer's glue; tempera paints

(9) Glitter dust; Elmer's glue; Manila paper

(10) Chalk in various colors; colored construction paper

(11) Minature town set

(12) Salt clay; rolling blocks, sticks

(13) Printing set of abstract forms; ink pad; newsprint

(14) Puzzles of various kinds

(15) Hand puppets

(16) Tinker Toys

(17) Construction toys

etc.

APPENDIX C

Test Data for Each Subject on All Measures

Classroom: A
Session: AM

	Age	Sex	Pre-S-E	Post-S-B	PPVT	Atten	Reten	Discrim	Persist	Diverg Uses: Total	Diverg Uses: Weight	Classif Prin	Classif Pattern
Sequential	72	F	83	83	38	4.2	2	6	38	15	23	8	11
	66	F	88	83	48	3.3	4	7	109	13	14	8	10
	68	F	93	97	39	5.3	3	10	240	14	14	10	14
	74	M		93	64	3.1	5	6	37	11	11	10	14
	67	M	87	92	54	5.0	5	7	240	11	11	10	12
	69	M	91	87	45	3.5	4	7	97	11	23	9	10
Expressive	65	F	60	85	45	2.4	1	5	31	14	14	7	11
	75	F	77	70	61	5.2	6	8	9[illegible]	11	14	5	6
	68	M	81	86	46	4.1	0	1	49	6	7	10	14
	75	F	118	117	56	5.5	6	8	240	7	13	12	17
	71	M	81	100	40	2.9	4	7	143	16	22	9	13
	73	F	76	94	46	2.7	2	7	193	11	20	10	13
	77	F	79	100	58	2.0	5	7	80	3	5	11	15
Control	67	F	76	74	43	10.6	3	7	51	6	9	4	5
	68	M	85	74	37	3.9	2	7	54	10	11	8	9
	76	F	77	93	45	2.8	5	6	71	14	29	5	5
	65	F	96	103	49	4.3	5	7	145	14	21	10	16

Classroom: B
Session: AM

	Age	Sex	Pre-S-B	Post S-B	PPVT	Atten	Reten	Discrim	Persist	Diverg Uses: Total	Diverg Uses: Weight	Classif: Prin	Classif: Pattern
Sequential	66	M	98	102	54	2.8	2	9	96	15	19	7	9
	70	F	62	70	27	4.6	5	10	34	3	3	8	11
	70	F	71	100	44	2.9	5	8	240	21	23	9	13
	71	M	72	82	45	3.1	5	7	74	18	25	10	14
	68	F	80	89	46	9.7	3	7	70	9	10	11	15
	78	F	98	100	46	3.4	5	6	101			7	8
Expressive	67	M	80	79	52	3.7	4	10	87	21	24	7	6
	72	F	100	86	51	3.9	5	8	66	18	24	10	12
	71	M	79	89	44	2.5	3	8	145	11	15	8	12
	73	M	86	88	54	3.8	2	7	78	16	22	7	11
	76	F	63	78									
	65	F	120	89	42	3.9	6	8	86	9	11	9	11
Control	67	M	81	77	43	8.2	4	9	226	11	11	8	11
	69	M	71	86	41	11.9	6	7	37	14	21	7	7
	71	F	90	91	40	4.5	4	7	32	6	6	6	6
	74	F	105	121	54	5.0	7	9	142	11	21	11	14
	68	M	98	103	59	2.6	4	7	240	8	10	11	13
	69	F	105	103	48	4.1	5	9	71	5	5	5	6
	70	F	79	75	31	8.6	3	3	86	12	14	8	11

Classroom: C
Session: AM

	Age	Sex	Pre-S-B	Post-S-B	PPVT	Atten	Reten	Discrim	Persist	Diverg Uses: Total	Diverg Uses: Weight	Classif Prin	Classif Pattern
Sequential	76	F	75	84	46	6.7	5	7	240	12	12	9	14
	70	F	94	89	47	2.0	5	9	204	4	4	11	18
	77	M	75	70	50	4.4	5	10	62	18	24	7	8
	74	M	73	75	29	5.0	4	7	94	14	20	9	14
	68	M	82	97	50	10.7	6	9	240	13	13	11	13
	75	F	103	120	61	3.6	4	7	230	15	19	12	17
Expressive	79	F		60	33	2.5	2	7	44	14	14	9	12
	77	F	79	76	57	3.8	5	10	139	14	19	11	13
	76	F	74	73	39	5.7	6	8	103	10	23	6	7
	72	F	91	83	44	2.8	4	8	199	14	15	5	6
	66	M	89	83	45	4.3	2	9	88	7	8	7	13
	76	M	87	80	51	2.5	3	10	86	19	23	9	11
Control	75	F	90	90	51	5.2	5	7	240*	1	1	5	5
	77	F	75	79	29	1.8	1	5	205	15	19	10	14
	68	M	82	95	44	2.0	4	6	108	12	18	7	11
	65	M	101	100	64	4.8	4	4	240	13	16	9	9
	68	F	96	92	47	2.3	3	9	106	9	11	9	12
	75	M	75	78	42	2.4	4	8	240	11	11	9	11

*Successfully completed task

Classroom: A

Session: PM

	Age	Sex	Pre-S-B	Post-S-B	PPVT	Atten	Reten	Discrim	Persist	Diverg Uses: Total	Diverg Uses: Weight	Classif Prin	Classif Pattern
Sequential	74	M	80	100	47	5.6	7	8	213	15	18	12	18
	64	M	69	71	30	4.8	4	7	110	16	22	9	10
	71	F	90	82	47	8.9	5	6	208	16	29	9	12
	76	M	86	98	59	6.5	8	9	240	20	21	11	15
	66	M		73	22	9.0			72	13	14	4	5
Expressive	68	M	89	95	51	30.1	5	7	107	14	19	12	16
	66	M	101	88	37	5.1	0	4	140	17	20	8	10
	68	M	100	103	59	10.2	4	10	41	15	23	10	13
	83	F	75	60	37	4.7	6	9		22	26		
	69	F	78	79	39	6.5	3	6	174	10	20	18	13
	68	F		84	48	11.0	6	7	111	12	26	11	16
	75	M	75	78	49	8.5	4	9	63	17	21	7	10
Control	75	M	95	96	54	4.2	5	9	240	16	20	11	16
	66	M	103	132	63	5.6	6	10		16	16	12	16
	65	M	78	88	43	3.6	4	8	15	16	25	8	11
	66	F	88	99	47	3.5	6	10	99	17	20	12	18
	67	F	91	75	45	4.3	7	8	240	21	25	5	5

Classroom: B
Session: PM

	Age	Sex	Pre-S-B	Post-S-B	PPVT	Atten	Reten	Discrim	Persist	Divers Uses: Total	Divers Uses: Weight	Classif Prin	Classif Pattern
Sequential	73	M	85	85	47	5.4	3	3	168	15	20	12	16
	69	F	93	96	55	7.5	9	10	123	14	20	12	15
	77	M	78	69	51	4.0	3	9	49	1	1	11	15
	77	F	81	86	45	5.6	6	9	240	15	24	12	16
	70	M	85	70	45	3.7	7	9	240	8	12	12	18
Expressive	76	F	100	87	48	3.7	6	8	240	22	34	10	13
	73	M		78	36	5.6	5	7	105			5	6
	77	M	78	80	50	4.9	7	10	198	20	25	11	16
	71	M	86	106	57	5.9	6	8	128	18	25	12	17
	70	F	79	80	48	4.0	4	8	240	13	15	4	7
Control	70	F	89	108	67	9.1	10	10	240	7	7	12	18
	73	M	86	90	54	5.8	4	6	209	10	10	9	10
	72	M	83	85	59	7.9	8	10	97	4	5	12	15
	74	M	88	91	49	5.9	7	10	240	18	21	11	16
	69	F	96	107	52	3.3	3	6	176	18	29	12	16
	67	F	87	98	46	3.0	3	10	133	14	15	12	16

Classroom: C
Session: PM

	Age	Sex	Pre-S-B	Post-S-B	PPVT	Atten	Reten	Discrim	Persist	Diverg Uses: Total	Diverg Uses: Weight	Classif Prin	Classif Pattern
Sequential	78	M	89	83	44	18.9	3	6	240*	9	12	12	14
	74	F	118	106	56	5.4	4	6		13	15		
	69	F	69	71	34	4.8	1	4	44	16	20	12	18
	66	M	85	81	32	5.4	2	4	107	11	13	4	5
	71	F		82	54	7.5	2	8	175	13	17	10	14
	85	F	87	98	50	3.4	5	10	240	14	17	11	15
Expressive	74	F	93	116	68	13.9	0	10	200	16	20	4	6
	76	F	89	97	75	2.5	5	9	240*	16	28	11	13
	76	F	77	77	32	2.7	4	8	125	9	9	12	13
	76	F	90	101	53	21.7	8	10	27	13	17	11	17
	74	F		75	41	4.3	4	7	178	12	15	8	13
	76	M	64	74	41	3.1	5	5	50			12	16
Control	75	F		88	44	7.1	4	4	240	11	15	10	14
	75	M		72	49	3.3	8	10	240	17	28	11	15
	66	M	101	93	51	3.6	6	10	240	6	7	12	15
	76	F		58	28	2.4	3	4	54	9	9	6	7
	72	F	97	94	51	3.9	2	7	240	10	14	11	16

*Successfully completed task

APPENDIX D

69/70

MEANS AND STANDARD DEVIATIONS FOR

CHANGE IN SCORES FROM PRE-TESTING TO POST TESTING ON STANFORD-BINETS

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	5	31.80	4.76	7	43.42	12.33	4	35.00	10.86
	P.M.	4	38.50	12.15	6	29.50	9.07	5	39.00	16.39
Classroom B	A.M.	6	42.33	9.65	6	28.83	16.89	7	35.86	8.55
	P.M.	5	28.80	8.50	4	34.50	13.53	6	40.33	6.56
Classroom C	A.M.	6	39.00	12.18	5	29.00	3.67	6	34.50	5.89
	P.M.	5	32.00	8.73	5	42.00	8.27	2	39.50	7.78

Note: As noted in text the means for change presented in this table have been converted into positive numbers. On this scale the point of "no change" is at the numberal 32.

MEANS AND STANDARD DEVIATIONS FOR

SCORES ON PEABODY PICTURE VOCABULARY TEST

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	48.00	9.82	7	50.29	7.93	4	43.50	5.00
	P.M.	5	41.00	14.81	7	45.71	8.34	5	50.40	8.17
Classroom B	A.M.	6	43.67	8.91	5	48.60	5.27	7	45.14	9.37
	P.M.	5	48.60	4.34	5	47.80	7.56	6	54.50	7.56
Classroom C	A.M.	6	47.17	10.38	6	44.83	8.50	6	46.17	11.48
	P.M.	6	45.00	10.17	6	51.67	16.90	5	44.60	9.72

MEANS AND STANDARD DEVIATIONS FOR

ATTENTION SCORES

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	4.07	.92	7	3.54	1.40	4	5.40	3.52
	P.M.	5	6.96	1.91	7	11.59	10.65	5	4.24	.83
Classroom B	A.M.	6	4.42	2.67	5	3.56	.60	7	6.41	3.26
	P.M.	5	5.24	1.51	5	4.82	.96	6	5.83	2.42
Classroom C	A.M.	6	5.40	3.02	6	3.60	1.26	6	3.08	1.51
	P.M.	6	7.57	5.71	6	8.03	7.98	5	4.06	1.79

MEANS AND STANDARD DEVIATIONS FOR

SCORES ON VISUAL RETENTION TASKS

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	3.83	1.17	7	3.43	2.44	4	3.75	1.50
	P.M.	4	6.00	1.83	7	4.00	2.08	5	5.60	1.14
Classroom B	A.M.	6	4.17	1.33	5	4.00	1.58	7	4.71	1.38
	P.M.	5	5.60	2.61	5	5.60	1.14	6	5.83	2.93
Classroom C	A.M.	6	4.83	.75	6	3.67	2.34	6	3.50	1.38
	P.M.	6	2.83	1.47	6	6.00	2.45	5	4.60	2.41

MEANS AND STANDARD DEVIATIONS FOR

SCORES ON VISUAL DISCRIMINATION TASKS

Classroom & Session	Instructional Condition								
	Sequential			Expressive			Control		
	N	M	SD	N	M	SD	N	M	SD
A.M.	6	7.17	1.47	7	6.14	2.48	4	6.75	.50
P.M.	4	7.50	1.29	7	7.43	2.07	5	9.00	1.00
A.M.	6	7.83	1.47	5	8.20	1.10	7	7.29	2.14
P.M.	5	8.00	1.33	5	8.20	1.10	6	8.67	2.07
A.M.	6	8.17	1.33	6	8.67	1.21	6	6.50	1.87
P.M.	6	6.33	2.34	6	8.17	1.94	5	7.00	3.00

MEANS AND STANDARD DEVIATIONS FOR

TASK PERSISTANCE SCORES

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	126.83	92.50	7	118.00	77.13	4	80.25	44.06
	P.M.	5	168.60	73.12	6	106.00	48.74	4	148.25	111.23
Classroom B	A.M.	6	102.50	71.43	5	92.40	30.58	7	119.14	85.93
	P.M.	5	164.00	81.35	5	182.20	62.91	6	182.50	58.51
Classroom C	A.M.	6	178.33	79.47	6	109.83	53.34	6	189.83	65.58
	P.M.	5	161.20	85.56	6	136.66	84.93	5	202.80	83.18

MEANS AND STANDARD DEVIATIONS FOR

TOTAL SCORES FOR DIVERGENT USES TASKS

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	12.50	1.76	7	9.71	4.61	4	11.00	3.83
	P.M.	5	16.00	2.28	7	15.29	3.90	5	17.20	2.17
Classroom B	A.M.	5	13.20	6.46	5	15.00	4.95	7	9.57	3.31
	P.M.	5	10.60	5.46	4	18.25	3.86	4	11.83	5.81
Classroom C	A.M.	6	12.67	4.72	6	13.00	4.10	6	10.17	4.92
	P.M.	6	12.67	2.42	5	13.20	2.95	5	10.60	4.04

MEANS AND STANDARD DEVIATIONS FOR

WEIGHTED SCORES ON DIVERGENT USES TASKS

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	16.00	5.59	7	13.57	6.19	4	17.50	9.29
	P.M.	5	20.80	5.54	7	22.14	2.91	5	21.20	3.83
Classroom B	A.M.	5	16.00	9.27	5	19.20	5.89	7	12.57	6.50
	P.M.	5	15.40	9.15	4	24.75	7.76	6	14.50	9.16
Classroom C	A.M.	6	15.33	7.15	6	17.00	5.83	6	12.67	6.65
	P.M.	6	15.67	2.94	5	17.80	6.98	5	14.60	8.20

MEANS AND STANDARD DEVIATIONS FOR

CLASSIFICATION TASKS SCORED FOR USE OF PRINCIPLES

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	9.17	.98	7	9.14	2.41	4	6.75	2.75
	P.M.	5	9.00	3.08	6	9.33	1.97	5	9.60	3.05
Classroom B	A.M.	6	8.67	1.63	5	8.20	1.30	7	8.00	2.31
	P.M.	5	11.80	.44	5	8.40	3.65	6	11.33	1.21
Classroom C	A.M.	6	9.83	1.83	5	7.83	2.23	6	8 17	1.83
	P.M.	5	9.80	3.34	6	9.67	3.14	5	10.00	2.35

MEANS AND STANDARD DEVIATIONS FOR

CLASSIFICATION TASKS SCORED FOR PATTERN

Classroom & Session		Instructional Condition								
		Sequential			Expressive			Control		
		N	M	SD	N	M	SD	N	M	SD
Classroom A	A.M.	6	11.83	1.83	7	12.71	3.50	4	8.75	5.19
	P.M.	5	12.00	4.95	6	13.00	2.68	5	13.20	5.26
Classroom B	A.M.	6	11.67	2.80	5	10.40	2.51	7	9.71	3.35
	P.M.	5	16.00	1.22	5	11.80	5.07	6	15.17	2.71
Classroom C	A.M.	6	14.00	3.52	6	10.33	3.08	6	10.33	3.08
	P.M.	5	13.20	4.89	6	13.00	3.85	5	13.40	3.65