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THE EFFECTS OF A HIGHLY STRUCTURED PRESCHOOL PROGRAM ON THE MEASURED INTELLIGENCE OF CULTURALLY DISADVANTAGED FOUR-YEAR-OLD CHILDREN. INTERIM REPORT.

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TWENTY-SEVEN DISADVANTAGED 4-YEAR-OLDS PARTICIPATED IN A STRUCTURED PRESCHOOL PROGRAM WHICH STRESSED LANGUAGE AND COGNITIVE DEVELOPMENT. THE CHILDREN WERE PLACED IN EITHER A MORNING OR AN AFTERNOON CLASS. THESE CLASSES WERE SUBDIVIDED INTO 3 ABILITY GROUPS, EACH WITH ITS OWN TEACHER WHO STAYED WITH HER CHILDREN. CONTENT AREA MATERIALS USED IN TEACHING MATH CONCEPTS, LANGUAGE ARTS AND READING READINESS, SOCIAL STUDIES AND SCIENCE WERE KEPT IN DIFFERENT ROOMS. THE TEACHER MOVED FROM ROOM TO ROOM WITH HER CLASS. LEARNING PERIODS WERE 25 MINUTES LONG AND EMPHASIZED A GAME FORMAT APPROACH. A TEACHER TO CHILD RATIO OF 1 TO 5 PROVIDED A CHANCE TO BUILD A MOTIVATIVE RELATIONSHIP AND OPPORTUNITY FOR TRANSFER AND REINFORCEMENT LEARNING. ALL CHILDREN WERE PRE- AND POSTTESTED ON THE 1960 STANFORD-BINET INDIVIDUAL INTELLIGENCE SCALE, FORM L-M. AT THE END OF THE 7-MONTH PROGRAM, THE CHILDREN SHOWED IQ TEST GAINS OF FROM 4 TO 29 POINTS SUGGESTING THAT SUCH A PROGRAM IS EFFECTIVE IN PREPARING PRESCHOOLERS FOR LATER ACADEMIC WORK. (THE FULL REPORT OF THIS LONGITUDINAL STUDY IS PS 000 349). (MS)

The Effects of a Highly Structured Preschool Program On the Measured Intelligence Of Culturally Disadvantaged Four-Year-Old Children

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INTRODUCTION

The relevant question for preschool education of disadvantaged children is no longer whether the functioning level of intelligence can be altered through early training or whether such training is practical with large numbers of children but how best to intervene in the development of these children to the end of preparing them for the educational and thereby the economic opportunities of a democratic culture. This paper discusses the interim results of one such program of intervention.[1] This highly structured program was designed to compensate for the effects of early deprivation, to ameliorate learning deficits accruing from such deprivation, and to accelerate the rate of growth in areas that will enable disadvantaged children to cope more successfully with later school tasks.

METHOD

Subjects

In the fall of 1966 thirty children were selected for placement in a preschool program according to the following criteria: 1) that the subject be from a low socioeconomic level home according to the father's occupation based on Warner's Revised Scale for Rating Occupations (1949) and housing ratings obtained through the City Planning Commissioner's Office; 2) that the subject be four years old by December 1, in keeping with public school entrance policies; and 3) that the subject have had no previous preschool experience. Mentally retarded children or children with gross physical

[1]The discussion here is one aspect of a larger, longitudinal study which compares two approaches to preschool education for disadvantaged children (a highly structured program and a traditional nursery school program) and which is supported through funds from the U.S. Office of Education, Grant 5-1181, Contract OE 6-10-235, allocated to the College of Education, Institute for Research on Exceptional Children, University of Illinois.

handicaps were excluded from the sample. The intelligence quotients of the children included in the program, as measured by the 1960 Stanford-Binet Individual Intelligence Scale, Form L-M, ranged from 78-113. Relatively equal numbers of boys and girls were chosen, and the ratio of Negro to white children (2:1) reflected an approximation of their numbers in the low socio-economic segment of the community. Three of the thirty children did not complete the program and therefore are not included in the analysis.

Program

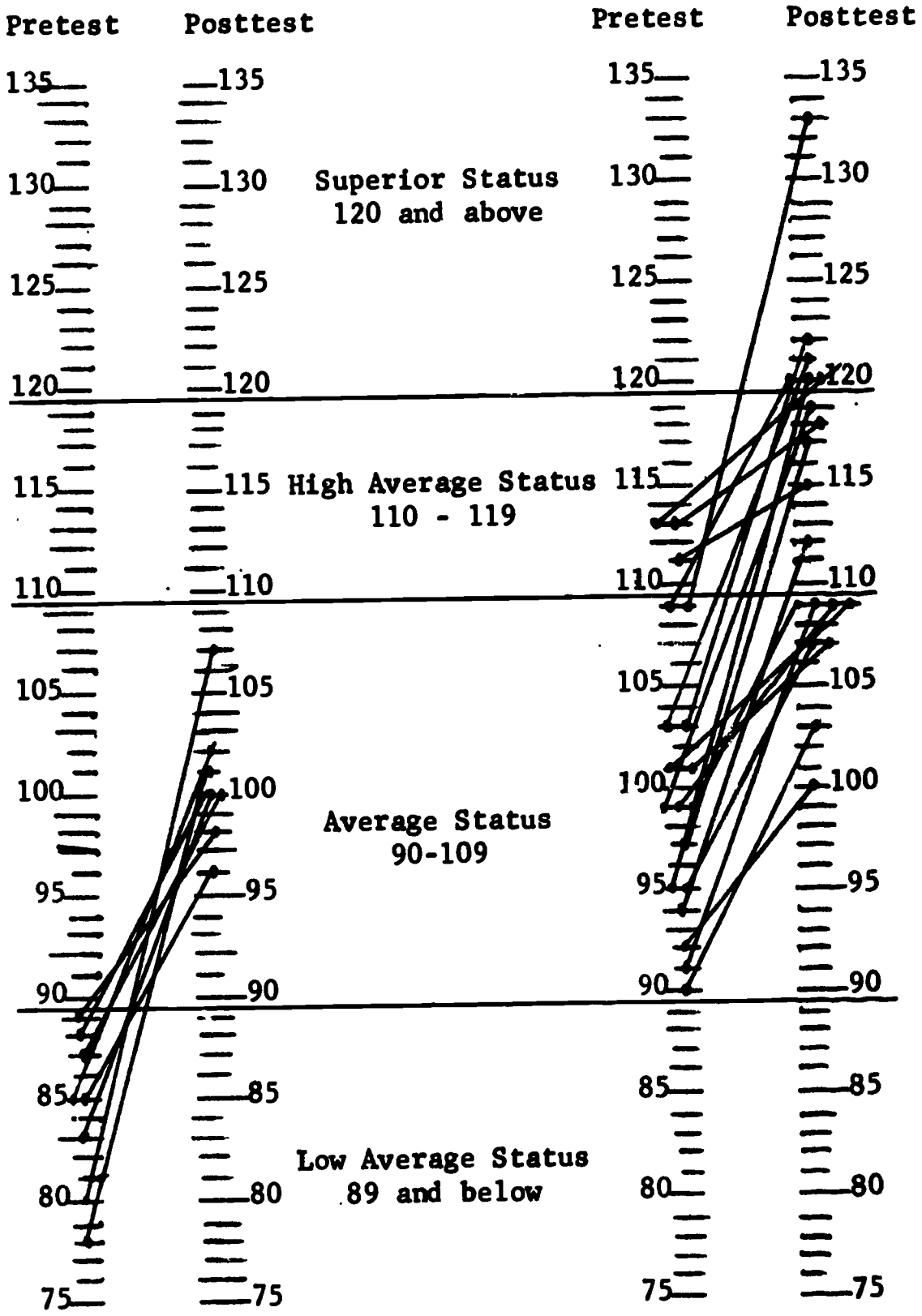
The children were divided into a morning and an afternoon class of fifteen. Each class met for two hours and fifteen minutes a day for the seven-month program interval. All children were bussed to a church where classes were held in basement rooms. Each class was divided into three ability groups with one teacher for each group, a teacher-pupil ratio of 1:5. Three relatively small, distraction-free rooms were used plus a larger room where the fifteen children could gather.

The principal focus of the daily schedule was upon three structured learning periods devoted to the teaching of math concepts, language arts and reading readiness, and social studies-science. Each of the three small rooms had materials appropriate to one of these content areas and each teacher, therefore, moved from room to room with her group of five children rather than relying on one large nursery room for all activities. These three content areas were chosen as the most directly related to early elementary curricula. Each learning period was approximately twenty-five minutes long.

Because of the importance of the teacher-child relationship in securing optimum motivation and in providing maximum opportunities for transfer and reinforcement of learning, the children did not change groups for specific

Figure I

Pre- and Posttest Intelligence Quotients
Of the Twenty-Seven Children*



* The pre- and posttest scores of children who initially fell into the low average status are recorded in the figure at the left; the scores of children who initially fell into the average or high average status are recorded at the right.

curriculum areas but remained with the same teacher for all content areas, for juice, and for field trips. Only at music time and during a brief period (less than fifteen minutes a day) of directed play were the children free to form their own peer groupings. Outdoor play equipment or traditional preschool toys such as dolls, toy appliances, or trucks were not used. During the period of directed play the children were primarily engaged in visual-motor activities such as puzzles, nesting and stacking toys, pounding sets, blocks, and clay. The music period was used to reinforce content currently being taught during other periods. Songs or rhythmic activities, for instance, stressed body parts when they were introduced in the science period. Color songs, counting songs, animal songs were introduced as they correlated with other curriculum content.

The math curriculum stressed useful vocabulary and basic manipulative skills. The general areas included the identifying and naming of five geometric shapes; one-to-one matching, especially as it is involved in copying patterns, in matching quantity, and in nonequivalent sets; dimensional terms and seriation; counting as a functional concept; the introduction of numerals as visual symbols, especially 0 through 5; beginning addition and subtraction, particularly with manipulative objects such as popsicle sticks, bottle caps, poker chips, and peg boards.

The social-studies-science curriculum followed an approximate school calendar, beginning in September with body awareness and self-concept developed through the use of body exercises, songs, pre-cut unassembled figures, and body outlines of the children. This unit was followed by family members and immediate home environment, using pictures from integrated primers; rubber play people and family puppets; clothing cut from catalogues and sorted according to body parts, particular family member, or season; furniture

items cut from catalogues and sorted according to type or appropriate room; go-together pictures such as a foot and a sock, a lawn mower and grass, a hammer and a nail. Mid-winter was devoted to a unit called kitchen science which attempts to demonstrate simple scientific principles but provides especially for opportunities for careful observation and verbalization of what has been seen, heard, tasted, or touched. Basic vocabulary included melt, boil, and freeze; relative temperature words such as cool, warm, and hot; dissolve; taste words such as sweet, sour, and salty; dry, wet and evaporate. Additional units in this curriculum included germination of seeds and plant growth, farm animals, wild animals, fruits, vegetables, community buildings, community workers, vehicles, weather, seasons, and time sense.

The language arts and reading readiness curriculum centered on vocabulary and language development: teaching the child to label, to make more precise verbal observations, to generalize, to use grammatically correct forms, to understand and to ask questions, and to formulate answers. In addition there were activities to develop the rather fine visual and auditory discriminations requisite for reading readiness and to develop visual-motor coordination.

Multiple copies of inexpensive books are the most important instructional materials in this curriculum. Such copies foster reading readiness because the child learns to hold the book right-side-up, to turn the pages singly and in sequence, to associate the pictures with the story being read, to develop left-to-right progression, and to associate the printed symbol with meaning. In addition the small group storytime provides opportunity for reinforcing and elaborating upon vocabulary previously taught; for both short and long range recall and memory activities; for sequencing events to show cause and effect and time relationships; for making inferences and, on

occasion, divergent responses. Finally, as a story is read, the child hears acceptable syntactical models and the familiar constructs of the language. He absorbs the rhythms and stresses of standard, informal English.

The basic teaching strategy stressed language development at all times but attempted to provide for concurrent multi-sensory experiences particularly during initial presentations. Initially, a game format was stressed: card decks, lotto games, models and miniatures, sorting, matching and classifying games; but all of these were run with verbal responses required as part of the play. Later in the year more use was made of mimeographed materials in a large, uncluttered form. Repetition at the same level of difficulty but with a varying format was used to program content because motivation to learn is enhanced through successful performance. The immediate correction and the differentiation of instruction possible with small group instruction provided for a high success ratio and fostered the development of intrinsic motivation. Frequent review, especially review which extended and elaborated the content, provided opportunities for relevant transfer of new knowledge, especially of vocabulary and sentence structure.

RESULTS

At the end of the seven-month program interval the IQ of the children enrolled in the highly structured classes had risen from 95.96 to 110.26, a gain of 14.30. Figure I plots the initial and post IQ's of the twenty-seven children and reveals a striking movement upward. Initially the scores of eight children placed them in the low average range of intelligence. At the time of the posttest, no child scored at this level. The initial scores of sixteen children placed them in the average range of intelligence, but on the posttest five of these children scored in the high average range and three in the superior range. All eight children who remained in the average

range scored higher on the posttest.

Table I records the shifts in IQ status by case count and percentages. Perhaps the most dramatic fact presented by this table is the reversal of the extremes: 29% of the children initially occupied the low average range and no child fell in the superior range. At the conclusion of the program interval no child remained in the low average range while 22% now tested within the superior range.

Table I

Shift in IQ Status from Pre- to Posttest

IQ Status	No. of Children at PRETEST	No. of Children at POSTTEST
Superior: 120 and above	0	6 (22%)
High Average: 110 - 119	3 (11%)	5 (18%)
Average: 90 - 109	16 (60%)	16 (60%)
Low Average: 89 and below	8 (29%)	0

Table II indicates the magnitude of gains and their consistency. No

Table II

IQ Gains by 5-Point Intervals

IQ Gains	Number of Children	
25 - 29	2	22% of the children gained from 20 through 29 IQ points.
20 - 24	4	
15 - 19	6	52% of the children gained from 10 through 19 IQ points.
10 - 14	8	
5 - 9	6	26% of the children gained from 0 through 9 IQ points.
0 - 4	1*	
Regressions	0	0% No child in the program failed to make an IQ gain.

* The lowest gain made during the program was four points.

child regressed and only one child made a gain below five points. More than half of the children gained from 10 to 19 points, gains greater than those reported by most studies involving a comparable preschool interval.

The consistency with which the program effected gains is further emphasized in Tables III, IV, and V. Initially the girls scored somewhat higher (Table III) than the boys, and on the posttest they maintained this relative superiority. Boys and girls made very nearly equal gains.

Table III

IQ Scores and Gains by Sex

Sex and Number	Pretest	Posttest	Gain
Female (N=14)	99.21	113.71	14.50
Male (N=13)	92.31	106.38	14.07

Initially the nine white children scored somewhat higher (Table IV) than did the eighteen Negro children, and they also maintained this relative superiority on the posttest. Negro and white children made very nearly equal gains.

Table IV

IQ Scores and Gains by Race

Race and Number	Pretest	Posttest	Gain
Negro (N=18)	93.50	107.50	14.00
White (N= 9)	100.67	115.56	14.89

Children in the low-average and average range gained slightly more than the mean gain of 14 points (Table V); only children who initially scored in the high-average range fell below the group mean. Apparently children in the higher range did not benefit as much from this program as did children in

the average and lower ranges of intelligence. It should be noted, however, that only 3 children scored initially in the high-average range and valid generalization from such a small number is questionable.

Table V

IQ Gains According to Initial Status of Subjects

Pretest IQ Status	Number of Children	Average Gain IQ Points
High Average: 110 - 119	3	5
Average: 90 - 109	16	15
Low Average: 89 and below	8	16

SUMMARY

This highly structured preschool program stressed language and cognitive development using a game format approach in three content areas. The program was characterized by sequentially ordered content, adequate repetition, immediate feedback, and differentiation of instruction. During the seven-month interval these children markedly improved their level of intellectual functioning and increased their relative intellectual standing among peers from a more favorable socioeconomic status. While these gains are most encouraging, subsequent evaluation must determine whether they are maintained or enhanced in ensuing school years. Since the Binet is purported to be the best single predictor of academic success, it is reasonable to conclude that these children are better equipped to cope with the tasks of the first grade as a result of their participation in this program. This far at least, the magnitude and consistency of the gains made by these culturally disadvantaged children suggest that such a structured program of preschool learning is effective in preparing them for later academic work.