DOCUMENT RESUME

ED 046 146 EC 031 021

AUTHOR Pratt, Eugene C.
TITLE Retarded Children: A Study of Educational Strategies.
INSTITUTION Northern Iowa Univ., Cedar Falls.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE 70
NOTE 30p.

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS Cognitive Measurement, *Educable Mentally Handicapped, Educational Objectives, Educational Programs, *Exceptional Child Research, Learning Theories, Mentally Handicapped, *Program Evaluation, *Teaching Methods
IDENTIFIERS Iowa

ABSTRACT

To evaluate the impact of a specific program on the learning of educable mentally handicapped (EMH) children, to assess the inter and intra-cognitive differences of the EMH, and to measure the relationship of children's learning to home circumstances, students from four Iowa Primary EMH classrooms were tested over a period of one academic year. The study was felt to reveal the inter and intra-child cognitive differences. However, it was felt that anticipated but localized cognitive gains are unlikely to be produced with a population of EMH children through experimental manipulation of a single curriculum variable during one academic year. Results were also felt to suggest that conditions in the home have little to do with the child's learning in the classroom. (CD)

RETARDED CHILDREN
A STUDY OF
EDUCATIONAL STRATEGIES

A Co-Operative Research Project
University of Northern Iowa
(Education Clinic)
and
Tri-County Special Education Unit
(Clayton, Delaware & Jones Counties)
Manchester, Iowa
Funded by a Title VI Grant
S-4-Fy-69

Manuscript Corrections

In a publication of this type, errors in printing often occur. The project staff respectfully call the reader's attention to the following corrections:

1. Table of Contents. The section heading listed as Results should read *Pre-Test Results*.

2. Page 3. Under the section titled A Model of Learning and General Design of the Study, *Table I is located on page 10 of the manuscript.*

3. Page 9.
   a. First word, seventh line, under Frostig headline, the word "scored" should read *scores*.
   b. Second paragraph, fifth line, under Frostig headline, "III" should read *II*.

4. Page 10.
   a. Last line, first paragraph, insert *BD+ and* before the words Vocabulary + and PA -.
   b. After Table I, the first line should be the notation *Table 1a*. This table is listed below:

Intra-Child Differences on WISC Subtests*

	Voc	DS	PA	Coding	OA	BD	Total
Voc	-	4	0	3	5	8	20
DS	3	-	4	5	5	10	27
PA	6	3	-	3	3	5	20
Coding	7	3	2	-	7	3	22
OA	2	2	0	3	-	3	10
BD	6	3	1	2	3	-	15
Total	24	15	7	16	23	29	114

*According to the Newman-Smith formula, all cited differences are significant at the .05 level.

5. Page 11.
   a. Fifth line, second parenthesis of figures should read *(6-15)*.
   b. Special Note: Under title Post-Test Results, the IQ's cited in the sixth line were obtained prior to children's admission to the EMH classrooms.

6. Page 12a. Table 3, the Oneida School had a *N=7*.

7. Page 14. Fourth line from bottom, the bracketed figure (15-17) should read *(15-27)*.

8. Page 15. First paragraph, fifth line after italicized section should be corrected to read as follows:

   Results with OA indicate that this continues to be an area of strength for both boys (pre-test 11-7; post-test 20-12) and girls (pre-test 12-3; post-test also 12-3). DS is also found to be an area of weakness for both boys (pre-test 6-15; post-test 9-14) and girls (pre-test 9-12; post-test 5-16). It is also noted that on pre-testing PA had been an area of weakness for both boys (4-12) and girls (3-8) but is not an area of weakness on post-testing (11-10; 3-5). On post-testing, coding was an area of weakness for boys (9-15) but here girls displayed relative strength (5-2).

RETARDED CHILDREN:

A

STUDY OF EDUCATIONAL STRATEGIES

A Co-Operative Research Project
University of Northern Iowa
(Education Clinic)
and
Tri-County Special Education Unit
(Clayton, Delaware & Jones Counties)
Manchester, Iowa
Funded by a Title VI Grant
S-4-Fy-69

RETARDED CHILDREN: A STUDY OF EDUCATIONAL STRATEGIES

PROJECT DIRECTOR

Mr. Eugene C. Pratt, Director Special Education
Clayton, Delaware, and Jones Counties
Manchester, Iowa 52057

RESEARCH CONSULTANT

Dr. Ralph Scott, Director Education Clinic
University of Northern Iowa
Cedar Falls, Iowa 50613

PSYCHOLOGICAL STAFF

Mr. Eugene R. Kall, Senior School Psychologist
Clayton, Delaware, and Jones Counties
Manchester, Iowa 52057

Mr. Donald Salisbury, Staff Psychologist
Clayton, Delaware, and Jones Counties
Manchester, Iowa 52057

CURRICULUM CONSULTANT

Mr. Donald Muller, Special Class Consultant
Clayton, Delaware, and Jones Counties
Manchester, Iowa 52057

TEACHING STAFF

Mrs. Loretta Duff, Special Class Teacher - Garnavillo Class
Mrs. Gertrude Meyer, Teacher Associate
Miss Judith Stokesberry, Special Class Teacher - Oneida Class
Mrs. Marcella Reese, Special Class Teacher - Wayne #8 Class

TABLE OF CONTENTS

TABLE OF CONTENTS (con't)

RATIONALE FOR THE PROJECT

It may be noted, with a degree of interest, that the endeavor of educational research is, in reality, in its infancy - a most unique position considering the advanced age of the profession of education.

If we in the field of special education are to function as true professionals, we must base our expertise upon some body of reliable knowledge or theory. In the professional fields of medicine, the military, business and the industrial complexes of our nation, research is viewed as a vital necessity. In the local school districts of our nation practical field research is, more often than not, viewed with vague curiosity or even disdain.

It took approximately 40 billion dollars, *over a span of years*, to place a man on the moon. Research of the space program yielded more than 10,000 new patents, for industrial and medical products. In the United States, *annually*, it is estimated that public schools spend approximately 50 billion dollars. However, it is estimated that less than one-fifth of one percent of the vast sums spent on education are directed toward research.[A]

The primary objective of this project was threefold:

1) To reevaluate several existing curricular problems in a three-county rural special education program for primary educable mentally handicapped children.

2) To investigate and develop improved teaching and curricular approaches for all educable mentally handicapped (EMH) children.

3) To stimulate other special educators to engage in similar types of research designed to add to a body of knowledge already assembled in the field of mental retardation.

[A] Hart, Leslie A. The Classroom Disaster, Teachers College Press, New York, 1969, p. 33.

Acknowledgments

This small research project was totally child and teacher oriented. It was designed to specifically assist the mentally handicapped child through the investigation of improved teaching techniques and materials. Such a project, however, could not have been accomplished without the personal and professional cooperation of many persons. This project director is deeply indebted to the following for the many extra hours of their personal time spent on this project.

The Clayton, Delaware, and Jones County Superintendents, Mr. Donald Potter, and Mr. Paul Jarman, who initially gave their permission to undertake this project.

Mr. H. M. Moore, Superintendent of Schools, Elgin, Iowa, for his permission to utilize the Elgin special education class as the control group.

Mrs. Marian Oelberg, Teacher, Elgin special class, for her excellent cooperation during the pre and post-test sessions.

Mr. Eugene R. Kell, Senior School Psychologist,

Mr. Donald L. Salisbury, School Psychologist,

and Mr. Donald C. Muller, Special Class Consultant of the Tri-County Special Education Unit, Manchester, Iowa,

and Dr. Ralph Scott, Director, Education Clinic, University of Northern Iowa.

One, of course, cannot overlook the professional commitment made by the project teachers:

Mrs. Loretta Duff and Mrs. Gertrude Meyer, Garnavillo Special Class.

Miss Judith Stokesberry, Oneida Special Class, and

Mrs. Marcella Reese, Wayne #8 Special Class.

RETARDED CHILDREN: A STUDY OF EDUCATIONAL STRATEGIES

The Problem of Labels

What is a retarded child? What can he learn, and how does he learn? These questions were easy to answer until about a decade ago. A "retarded" child secured a "retarded IQ" -- and was given a curriculum for retarded children. We know now that this answer was too pat, too glib. It permitted us to standardize programs for children who very probably are just as unique as "normal" children. But, it was easy and it was convenient to pin a label on a child and then to deal with him according to the label. As Dr. Samuel Ashcroft observed at a recent meeting of the President's committee on Mental Retardation, educators have in the past found it easy to inappropriately label children by giving tests and then to deal with the children so that they behave according to the label.[1]

This report describes a study which sought to identify the abilities of "retarded" children as well as educational procedures which might facilitate the learning of individual children. In brief, children attending four classrooms of educably mentally handicapped (EMH) children were given a wide battery of tests in the spring of 1969 and the same tests were again administered in the spring of 1970. During the period between testing three groups of EMH children were provided with specific programs of instruction: one group served as a control and was not given an experimental program.

Since this brochure will be made available to busy people who may prefer not to work through statistics which at times may become a bit complex, the authors have italicized some of the key findings which appear to have specific implications for the practicing educator whether he is a classroom teacher, curriculum director, counselor, school psychologist, special reading teacher or administrator. The authors themselves were surprised by some of the findings and would be pleased to correspond with any reader who wishes clarification concerning some of the issues which are raised in this report.

A Model of Learning and General Design of the Study

The psycholinguistic model of learning proposed by Kirk and Paraskevopoulos[2] was modified and adopted for this study. According to this model which is sketched on Table I, children's learning involves three forms of input (visual, auditory, tactual), integration of those signals,

and verbal or motor expression. Feedback is seen as a central cognitive and effective component of the model, and the Memory Bank plays a direct role in interpretation and synthesis of incoming messages and determination of how expressive behavior is to be formulated and executed.

The experimenters were primarily interested in the learning behaviors of the children involved in this study, and focused on three prominent forms of cognitive response: (1) verbal expression (2) visual-motor expression and (3) behavior which results after the organism has processed information within the integrative apparatus. The next step was to determine whether a particular program, providing systematic enrichment activities in these three domains, would produce qualitative changes in the responses of the children. Accordingly, three programs were selected to represent each of the specific domains of cognitive behavior. The *Peabody Language Development Kit* (School D) was chosen as a curriculum supplement which emphasizes expressive language; the *Frostig Program for the Development of Visual Perception* (School B) was selected as a program which focuses on visual-motor activites; the *Learning Readiness System: classification and seriation* (School A) was chosen as a series of exercises which emphasized growth of general reasoning through interaction of perceptual and language experiences.(3, 4)

Finally, it was necessary to find tests which presumably measure children's behaviors in the three domains under consideration. For this purpose the following tests were selected:

LANGUAGE
- WISC: selected subtests
  - Vocabulary (V)
  - Digit Span (D Sp)

VISUAL MOTOR
- WISC: selected subtest coding (Cod)
- Frostig Test of Visual Perception
- WPPSI Geometric Designs subtest

INTEGRATIVE
- LRS Seriation Test (LRS ST)
- WISC: selected subtests
  - Object Assembly (OA)
  - Block Design (BD)
  - Picture Arrangement (PA)

The experimental design called for each experimental school to provide approximately twenty-five minutes a day of activities from the prescribed program. It should be noted that in all four participating schools curriculum materials other than the experimental materials were utilized.

This study simply added a new dimension to the already existing curricula of the participating schools. The total educational programs of the various schools are summarized in Appendix A.

The reader will also note that the tests used to measure change in the children's behavior are characteristically thought of as "IQ" tests. It should be pointed out that the experimenters concur with Hunt who states that there is a good deal of overlap between achievement and IQ tests although IQ tests typically measure broader cognitive functions, while achievement tests are usually more narrow in focus and are often thought to consist of the more "teachable" skills.[5] At the same time, the writers believe that there is a good deal of merit in Bloom's comment that it is useful to distinguish between IQ and achievement measures since about 2/3 intellectual development is determined by age 17 while only 1/3 of achievement patterns are determined by six.[6] However, the experimenters take the position that both IQ and achievement scores are subject to change which may be brought about by a stimulating and enriched environment.

Objectives of the Study

This experiment sought to answer three clusters of questions. *The first set of questions* dealt with the impact of a specific program on the learning of EMH children. For example, it was expected that children participating in the Peabody Program would obtain higher post-test gains on expressive language measures, children involved in Frostig activities would register greater post-test gains on tasks weighted in visual-motor activities, and children provided with experiences in the Learning Readiness System would attain greater post-test gains on subtest measures which stress general reasoning.

The second set of questions consisted of assessing inter and intra-child cognitive differences of the EMH children. *Inter-child differences focus primarily on the range of capabilities in a given cognitive area within the classroom, and how the teacher can cope with this range; intra-child differences, on the other hand are concerned with the range of skills a particular child possesses.* Historically, intra-child skills have been more elusive to the educator who is concerned with individualizing instruction since we unfortunately tend to think of a child as "bright" or "slow". In the process of labelling a child in a global sense, a child's cognitive profile is often masked.

It is not particularly difficult, for example, for a teacher to describe general characteristics which differentiate one child from another and thus to deal with inter-child differences. But, it is a good deal more difficult for even the most skilled teacher to identify the particular ways in which a child may differ *within* himself: One

child may be generally brighter than another, for example, but close examination may reveal that the "slower" child is much more capable of succeeding on certain types of tasks than he is on others. Often only the most sensitive observation and testing reveals how the curriculum must be adapted so that the "slow" child's potentialities are recognized and utilized to maximize his success within the classroom.

Finally, this experiment considered a third cluster of questions which measures the relationship of children's learning to home circumstances. To test this, the teachers were asked to briefly describe home conditions of the children in their class. The raters were told to consider a home favorable if it was organized, provided adequate food, shelter and clothing, and if the parents or parent administered consistent discipline.

Subjects

Ss were Caucasian students of four rural Iowa Primary EMH classrooms. Educable Mentally Handicapped (EMH) placement for 40 of the 43 subjects (Ss) had been largely based on results of the Stanford-Binet (20) or WISC (20). With the exception of one unusually high (IQ 87) score, Ss' IQs ranged from 50 - 81 with a mean of 65.6. On the Binet, the mean for boys (N 11) was 63.8, for girls (N 9) 64.5. On the WISC the boys' (N 14) IQ was 62.9; girls' (N 6) mean IQ was 68.8. Furthermore, on all WISC subtests the Ss' mean Scaled Score (SS) ranged from 3.7 (Coding, School A) to 6.3 (Digit Span, School B); all average SS, in all schools, were within the EMH bounds. (SS from 2 thru 6).

Procedures and Tests

All Ss were pre-tested by qualified psychological examiners in April or May, 1969, and post-tested approximately a year later. The three experimental programs were initiated in the second week of September, 1969, and terminated at the end of April, 1970, just before the initiation of post-testing.

Each child was tested on six selected WISC subtests (Digit Span, Block Design, Object Assembly, Vocabulary, Coding, and Picture Arrangement). Since each WISC subtest has a mean SS of 10 and a standard deviation of 3, and because admission to EMH classrooms requires an IQ between 50 and 80, SS of 9 or above were considered to fall within the average range; SS of 1 or 0 were considered to be within the trainable (IQ 25-50) classification. It was recognized that this procedure could be questioned. However, a SS of 7 is equivalent to an IQ of 85; since the SS SEm on all subtests except Digit Span for Ss 7½ years of age is less than 2 there is approximately a 2-1 chance that with a SS of 9 the Ss' true SS is at least 7 which is substantially higher than the upper limits of the EMH range.

In assessing intra-child differences on the WISC subtests, the Newland-Smith formula was employed since it specifies the SS differences necessary if they are to be statistically significant.(7) According to this formula, a difference of four SS between V and BD is significant at the .05 level, while to be significant at the .01 level the difference must be at least five SS. For purposes of this study, significance was established at the .05 level. All subtest differences were computed on the Newland-Smith formula for children with CAs less than nine.

Each child was also tested on the Frostig Developmental Test of Visual Perception, the LRS Seriation Test, and the Geometric Design subject of the Wechsler Preschool and Primary Scale of Intelligence. Scaled scores (SS) were obtained on the six selected WISC subtests according to the child's chronological age (CA) at the time of pre and post-testing. The other instruments have limited CA ceilings which were held constant for pre and post-testing as follows:

Geometric Design Subtest of the WPPSI	CA 6½ years
LRS Seriation Test	CA 6 years and eleven months
Frostig Test of Visual Perception	CA 7 years and ten months

In evaluating the results of this experiment it must therefore be noted that on all instruments except the WISC the CA was unchanged although the children were about a year older on post-testing than they had been at pre-testing.

RESULTS

Pretest Profiles (inter-child and intra-child)

The first cluster of results became available immediately after pre-testing, and revealed the rich variety of cognitive capabilities which characterize the cognitive profiles of "retarded" children. These results are considered along two dimensions (1) inter-child scatter, with an emphasis on differences *between* children and (2) intra-child scatter which emphasizes cognitive differences *within* children.(*)

WISC

A. Inter-child Scatter. On initial testing it was found that 19, or 44% of the 43 Ss who were given the WISC subtests obtained a SS which is at least within the average range on at least one WISC subtest. Twelve,

---

* The cognitive profiles of Ss are partially described in an article scheduled for publication in the July, 1970 issue of Psychology in the Schools.

or 28%, of the 43 Ss obtained at least one SS in the trainable range.

To some extent, sex appears to be a relevant factor on the inter-child differences noted on the pre-test WISC subtest scores. More boys (49%) than girls (38%) had at least one WISC subtest SS in the average range, while the situation was reversed (38% of girls: 22% of boys) with respect to WISC subtest scores within the trainable range.

In each of the four classrooms, the SS scores ranged from trainable to at least average on not less than one WISC subtest. There was a range from trainable to average in BD subtests in all four classrooms, but in no classroom did this full range occur with respect to PA. The average within classroom range of SS extended from a low of 5½ (PA) to 12 (BD).

From these pre-test results with the WISC subtests, the following questions seem warranted:

> *Are more boys than girls placed in EMH rooms not because of limited ability but because of behavioral difficulties?*
>
> *What curricula provisions should be made for these EMH children in order to accomodate the wide inter-child differences in some tasks, the relatively narrow range of abilities on other types of tasks?*

LRS Seriation Test

On the LRS Seriation Test, the range of scores in every classroom extended from prekindergarten to second grade. *These results indicate that in each of the four classrooms some children would be bored by readiness activities while others would not succeed unless given pre-readiness experiences.* It is also noted that the distribution of boys' LRS Seriation Test scores is skewed at both the upper (superior) and lower (trainable) ends, while girls' Seriation Test scores are more evenly distributed throughout all the readiness levels.

For example, 58% of boys and 44% of girls achieved a SS of six or less; 36% of boys and 56% of girls a SS from 7 - 13; SS of 14 or more were obtained by 6% of the boys, 0% of girls. *These results support the evidence previously mentioned that perhaps some of the boys may not be so limited cognitively as they are in need of help for behavioral reasons; on the other hand the skewed distribution of boys at the lower end of the LRS ST spectrum appears to confirm the well established fact that boys develop somewhat more slowly than girls, and suffer a higher incidence of prenatal and birth complications.* The need to individualize instruction of retarded children is underscored by the observation that when the five factors of the LRS ST are broken down into three groups (A: top quartile; B: second and third quartile; C: fourth quartile) and 60 possible cells

(school x factor x score) are formed, in each classroom and on each factor the Ss' seriation capabilities ranged from the top to the bottom quartile.

WPPSI Geometric Design Subtest

The range of SS on the Geometric Design subtest was as follows: School A, 2-18; School B, 3-12; School C, 4-11 and School D; 0-15. Of the 44 Ss given pre-tests on the WPPSI Geometric Designs, 17 scored within the average range for 6½ year old children: one child obtained a SS considered within the trainable range on the basis of norms for children of 6½. *These results therefore suggest that retarded children vary greatly in their capacity to reproduce figures and that the school must deal with the children as distinct individuals. Some children need help in reproducing a circle; others are capable of reproducing very complex forms.*

Frostig Development Test of Visual Perception

On the Frostig, results indicate that some subtests were much more difficult for the Ss than other subtests. For example, 20 of the 45 Ss (30 boys, 15 girls) to whom the Frostig was administered *obtained an average score (based on the ceiling CA SS of 9 or above) on subtest I, while not a single S obtained a SS of 1 or 0. Comparable figures for the remaining subtests were 5 average and 3 trainable scored: 7-16; 10-1 and 13-5. As a group it therefore appears that* "retarded" children have far less difficulty with Subtests I and IV, (Eye-Motor Coordination: Position in Space) but substantially more difficulty with Subtests II and III (Figure-Ground and Form Constancy). Although there were twice as many boys as girls tested, as many girls as boys obtained average scores on Subtest IV (5-5) and V (5-6). This supports the results obtained with other experimental measures which indicate that *the curriculum needs of "retarded" boys and girls may be very different.*

Within each of the four classrooms, the range from trainable to average (SS of 0 or 1 to 9 or above) was found only with respect to Test III; on Test I this full (trainable to average) range was not found in a single classroom. Also, the full range was noted in two classrooms on Test III, one classroom on Test IV and two classrooms on Test V. *These between classroom differences indicate that curriculum needs of the children vary greatly from room to room.*

Intra-Child Differences Noted at the Time of Pre-Testing

Intra-child differences on the WISC subtests revealed that thirty of the 43 Ss (19 boys and 11 girls: 70% of each sex) obtained intra-subtest score differences which, according to the Newland-Smith formula, are statistically significant at the .05 level. These differences are

summarized in Table I where the figures in columns cite the statistically significant pluses, rows the minuses. It is noted for example that eight boys obtained significantly higher BD than Vocabulary scores while with six Ss Vocabulary scores were significantly higher than attainments on BD. It should be pointed out that some Ss may have obtained a plus and minus score on the same subtest. To accomplish this, the S might have secured a SS of 12 on BD and a SS of 8 on Vocabulary; this produces a BD + and a Vocabulary -. On the other hand if the same S secured a SS of 1 on PA he would also be credited with a Vocabulary + and PA -.

TABLE I

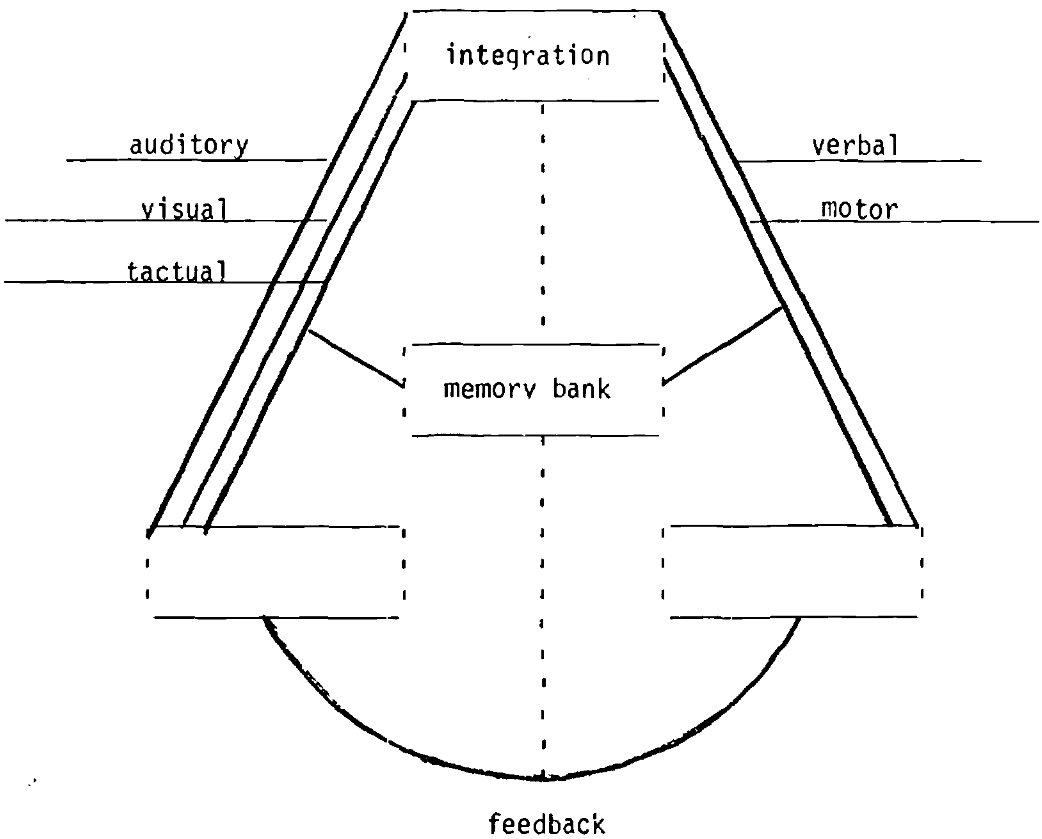

Table I reveals a tendancy for within-childrens' strengths to cluster about BD (29-15) and OA (23-10); both these subtests are heavily loaded in what Cohen refers to as Perceptual Organization.[8] Within-child weaknesses are especially noted on Digit Span (15-27) and PA (7-20). When this information is broken down by sex, however, the figures assume quite different meanings. Here it is noted that within-child strengths

of boys is pronounced in Bd (25-6), while BP is associated with girls' within-child cognitive deficiencies (4-9). On the other hand, OA is an area of relative strength for girls (12-3) but not markedly so for boys (11-7). Furthermore, with girls D Sp is not clearly a discriminating subtest (9-12) but it is with boys (15-6). For both boys (4-12) and girls (3-8), PA appears to be an area of cognitive weakness. *THESE RESULTS INDICATE THAT THERE MAY BE VALUE IN ACQUAINTING EMH TEACHERS WITH THE IMPLICATIONS OF INTRA-CHILD COGNITIVE DIFFERENCES IN TERMS OF INDIVIDUALIZING INSTRUCTION SO AS TO MAXIMIZE THE CHILDREN'S SUCCESS.*[9]

Seriation Test

Fourteen, or 32% of the Ss (10 boys, 4 girls) obtained scores ranging from the top (A) to bottom (C) quartile of the LRS ST. This suggests that *even within the cognitive process of seriation a substantial number of EMH children reveal unusual unevenness of capabilities which may require extremely sensitive and carefully sequenced child-to-child, but teacher directed, experiences as suggested in the LRS Seriation Test manual (pp 41 to 48).*

Frostig

Frostig scores of five of the 45 Ss (or 11%) reveal a full within child (trainable to average) range. This figure is substantially lower than the proportion of "retardates" who secured a full within-child range on the LRS ST (32%). These differences are not easy to reconcile but may be related to the fact that the LRS factors were derived through factor analysis. Another possible explanation may be that the Frostig materials are closely associated with basic maturational development while seriation skills may be more experientially based. Further research is needed to assess the educational implications of these within-child differences. *Certainly it appears that the learning patterns as well as the potentialities of children who obtain a full range of scores within a particular battery would require different educational programming than "retarded" children whose within-battery scores hold to a constructed range.*

POST-TEST RESULTS

Thirty-three of the original 45 Ss were still in the same classrooms at the time of post-testing (22 boys, 11 girls). The IQs of these Ss were compared with the IQs of those Ss who had transferred, to determine whether the attrition was sufficiently selective so as to change the general ability patterns obtained at the time of pre-testing. It was found that the average IQ for boys on pre-testing was 66.7; on post-testing it was 63.3; for girls the means were 68.4 (pre-test) and 62.4 (post-test). A *t* test was performed on these scores, which proved to be statistically insignificant.

Post-test results are considered in terms of (1) inter and intra-child scores (2) possible influence of specific programs on Ss' learning patterns (3) impact of home factors on the learning of retarded children.

INTER-CHILD DIFFERENCES

WISC

Despite the reduction in the number of Ss post-tested, and as shown on Table 2, *there was a noticeable increase in the number of WISC SS obtained within the average range. At the same time there was a consistent decrease in the incidence of SS within the trainable range.* In each school there was approximately a three fold increase in WISC average SS. Whereas in pre-testing 49% of the boys obtained at least one WISC SS score in the average range, on post-testing the proportion rises to 82%. With girls, the percentages rise from 38% to the same figure attained by boys - 82%. On pre-testing 22% of the boys obtained at least one trainable score: on post-testing it is 23%; comparable figures for girls are 38% (pre-testing) and 27% (post-testing).

TABLE 2

Average and Trainable SS on Pre and Post-Testing

Pre-Test			Post-Test		
Average Score 9+		Trainable Score (1 or 0)	9+ on post-test		1 or 0 on post
PA	1	4	PA	5	0
D Sp	6	3	D Sp	13	3
Cod	2	3	Cod	12	1
OA	3	3	OA	15	3
BD	4	5	BD	6	1
Voc	3	1	Voc	7	0
Totals	19	19		58	8

When the figures are broken down by individual child and by school, as shown on Tables 3 to 6, however, it is clear that the subtests within which average SS are achieved are quite different for experimental than for control Ss. Thus we note that on post-testing eight of the ten subtest SS scores within the average range in the control school (C) were in Coding or Digit Span; on the other hand the average SS obtained in the three experimental schools are more diversified. If we consider Jensen's distinction of Level I and Level II tests,[10] *it seems that Ss within the experimental schools were manifesting capabilities in more complex types of cognitive behaviors.*

TABLE 3

Oneida School A
Pattern of Average and Trainable SS achieved by individual children in School A on pre and post-testing

Pre-Test Average Score (9+)	Pre-Test Trainable Score (1 or 0)	Post-Test Average Score (9+)	Post-Test Trainable Score (1 or 0)
		OA	
	D Sp, Cod	Voc, PA, OA	Cod
BD	Cod	BD	
	BD		BD
	D Sp		D Sp
		PA, Cod	
D Sp, PA, Cod		Cod, Voc, D Sp, BD, OA	

TABLE 4

Garnavillo School B
Pattern of Average and Trainable SS achieved by individual children in School B on pre and post-testing
N=9

Pre-Test Average Score (9+)	Pre-Test Trainable Score (1 or 0)	Post-Test Average Score (9+)	Post-Test Trainable Score (1 or 0)
		OA	
D Sp		D Sp, Cod	
		BD	
		Voc, D Sp, Cod	
D Sp		Voc, PA	
Voc		OA	
D Sp	BD	D Sp, OA	
Cod		OA, Cod	

TABLE 5

Control School C
Pattern of Average and Trainable SS achieved by individual children in School C on pre and post-testing
N=7

Pre-Test Average Score (9+)	Pre-Test Trainable Score (1 or 0)	Post-Test Average Score (9+)	Post-Test Trainable Score (1 or 0)
		D Sp	
		D Sp, Cod	
	PA, BD, OA	D Sp	OA
		D Sp, PA, Cod	
D Sp, BD, OA		D Sp, BD, Cod	
	Voc, PA, BD		D Sp

TABLE 6

Wayne School D
Pattern of Average and Trainable SS achieved by individual children in School D on pre and post-testing
N=10

Pre-Test Average Score (9+)	Pre-Test Trainable Score (1 or 0)	Post-Test Average Score (9+)	Post-Test Trainable Score (1 or 0)
BD		Voc	
		OA	D Sp
OA	D Sp	Voc, OA, Cod	
BD		PA, BD, OA	
		D Sp, BD	
		OA, Cod	
Voc, D Sp		Voc, D Sp, OA Cod	
	PA, BD, OA, Cod		OA
	PA, OA	D Sp	OA
Voc, OA		D Sp, OA, Cod	

It should also be noted that the rise in the number of Ss with average SS was especially marked in the case of Coding (pre-test 2, post-test 12) and Object Assembly (3-15); pronounced declines in the number of SS in the trainable range are observed with Picture Arrangement (4 to 1), and Block Design (5 to 1).

Further research is indicated to determine whether or not these changes are associated with such factors as the "Hawthrone Effect", or the classroom teacher. There is also the possibility that the increase in the number of average SS might be traced to the influence of pre-testing experience. However, the liklihood of this seems remote in view of the evidence that WISC subtests yield high reliabilities with mentally retarded (IQ below 80) boys at intervals from three to four months.[11]

The difficulty of individualizing instruction on the basis of children's competencies is also illustrated in Tables 3 to 6 which summarize the pattern of subtest scores in which the Ss achieved average scores. These tables reveal that each child's scores form a quasi-unique profile. Littell has referred to these quasi-unique characteristics of intelligence and suggested it may largely explain why the WISC has failed to yield helpful factor analytic information applicable to large numbers of students.[12] Consider just one example of this: in his factor analysis, Cohen[8] found Object Assembly and Block Design to co-exist in what he termed the "Perceptual Organization" factor. However, when we evaluate post-test results on the WISC subtests, eleven Ss obtained an average SS on OA without an average score on BD; four Ss obtained an average SS on BD but not on OA, and only two Ss obtained an average SS on both Object Assembly and Block Design. *These results have profound curricular implications if it is true, as some aver, that WISC subtest scores may be translated into specific suggestions with respect to classroom procedures.*[9]

LRS Seriation Test

Post-test results with the *LRS Seriation Test* indicate that the within-classroom range for School A declined from SS of 1 to 11 (pre-test) to 7-14 (post-test); for School B the range declined from 0-11 to 6-13. However, the range widened with School C and D (0-9 to 1-11; 0-13 to 1-14). These results suggest that the within-classroom range on the Seriation Test narrowed in the case of Ss given the Learning Readiness System and Frostig materials while this did not occur with Ss attending the Control School and the School which utilized the Peabody materials. Whereas 33% of the boys had obtained pre-test Seriation Test scores which indicated that they were ready to begin formal reading, the percentage increased to 41% on post-testing. Pre-testing indicated that 53% of the girls were ready for formal reading, while post-test Seriation Test scores indicated that 73% of the girls were ready for formal reading. *Again, the findings suggest that within the primary EMH classroom the teacher must be prepared to provide experiences ranging from pre-readiness to formal reading.*

Geometric Design

Relatively little change is noted with respect to the within-classroom range on the WPPSI Geometric Design subtest. On pre-testing, the ranges were School A: 2-18 to 3-17 (post-testing); School B: 3-12 to 5-11; School C: 4-11 to 3-9 and School D: 2-15 to 3-15. Although this experiment utilized only a small number of Ss, it is nonetheless of interest that the range on Geometric Design is so broad that the Primary EMH teacher must be prepared to sequence visual-motor experiences along a broad front extending from prekindergarten to second grade.

Frostig

Frostig post-test results indicate that, as had been noted on pre-testing, Ss' scores on Factor I were substantially higher than on other Frostig subtests (20 Ss with SS of nine or above; no S with SS of 0 or 1); on Factor II there were eight average scores, not a single trainable score. For the remaining factors the figures were 10-3, 13-0 and 11-1 respectively. *Of the total number of scores which fall within the average range on the Frostig, 33 were achieved by boys and 29 by girls; since there were twice as many boys as girls participating in post-testing, this data is consistent with pre-test information in which girls seemed to do relatively better on the Frostig instruments. Furthermore, there is reason to believe that some EMH boys have a good deal of difficulty on particular Frostig exercises and that this occurs much more frequently than in the case of girls,* as witnessed by the fact that on pre-testing boys' trainable scores on the Frostig outnumbered girls by 12-1 and on post-testing by 4-0.

INTRA-CHILD

WISC

Again using the Newland-Smith formula, the results indicate that 85% of the Ss (90% of the boys, 64% of the girls), given post-testing on the WISC (N=22 boys, 11 girls) secured intra-subtest score differences that are statistically significant at the .05 level. These differences are summarized in Table 7 where again the figures in columns refer to the statistically significant pluses, rows the minuses. As had been the case on pre-testing, *within-child strengths are again clustered in the BD and OA subtests which are felt to be associated with Cohen's Perceptual Organization factor.*(8) However, BD is no longer strongly associated with within-child weaknesses. For example the incidence of within-child plus and minus on BD was 29-15 on pre-testing but 25-21 in post-testing. On the other hand, the relative superiority of within-child strengths in OA (23-10) is repeated on post-testing (32-15). *On pre-testing, Digit Span had been associated with within-child weakness (15-17) and this is also the case on post-testing (14-30). Pre-test results revealed within-child weaknesses to be linked with Picture Arrangement (7-20) but it is not the case on post-testing (14-15).*

TABLE 7

Intra-Child Differences on Post-Test WISC Subtest

		Strengths						
		Voc	D Sp	PA	Cod	OA	BD	TOTAL
Weaknesses	Voc		2	1	3	5	6	17
	D Sp	3	---	5	5	10	7	30
	PA	2	3	---	2	5	3	15
	Cod	3	2	4	---	4	4	17
	OA	4	2	1	3	---	5	15
	BD	4	5	3	1	8	---	21
	TOTAL	16	14	14	14	32	25	115

When this information is broken down by sex, BD is no longer found to be a particularly strong area for boys (17-18) but it is for girls (8-3); this is a remarkable shift in cognitive structure of retarded children since the results on pre-testing were very different (55-6 for boys; 4-9 for girls). Results with OA indicate that this *continues to be an area of strength for both boys* (pre-test 6-15; post-test 9-14) *and girls* (pre-test 9-12; post-test 5-16). It is also noted that on pre-testing PA had been an area of weakness for both boys (4-12) and girls (3-8) but is not an area of weakness on post-testing (11-10; 3-5). *On post-testing, coding was an area of weakness for boys (9-15) but here girls displayed relative strength (5-2).*

These results also suggest that during the experimental year the pattern of intra-child differences became more variegated. For example, on pre-testing the incidence of intra-child significant differences for WISC Ss for the 43 Ss taking the WISC pre-tests is approximately the same (114) as the intra-child differences noted with the 33 Ss who took the post-tests (115). *Assessment of these differences revealed that they are largely accounted for by the School A.* For example, pre and post-test incidence of intra-child differences rose from 21-38 in School A, remained the same (23-23) in School B, decreased only in School C, the control school (18-15), and remained stable (39-39) in School D.

Evaluation of the Experimental Programs

Table 8 summarizes the average changes on the various test measures which were secured with children of the four classrooms. Since a limited number of Ss participated in the program, and because group differences

may easily be obscured because some Ss may show large changes in certain scores, the averages may be somewhat misleading. Nonetheless, the results indicate that the experimental program did not generally bring about the specific cognitive changes which were anticipated. For example in School A, which stressed integrative learning, greater gains were not produced in Object Assembly, Block Design, or Picture Arrangement. School D, which emphasized language experiences failed to bring about greater gain in Vocabulary and Digit Span. Table 8 also reveals that, as predicted, School B which employed the Frostig materials did secure *substantial gains* in the Geometric Designs subtest of the WPPSI but that it failed to demonstrate unusually strong gains in Coding or the Frostig measures. However, the larger LRS gains were secured in the experimental Schools A and B. *These results strongly suggest that Ss gains were not significantly related to performance in specific tests which were theoretically associated with specific types of sequential experiences.*

TABLE 8

Average Scale Score Changes Pre to Post-Testing on Various Test Measures

	LRS	V	D Sp	PA	BD	OA	Cod	Frostig	WPPSI GD
School A	3.4	1.4	1.1	1.3	.9	1.7	2.3	1.4	.9
School B	3.4	.1	.1	2.0	1.5	3.1	1.4	1.5	1.7
School C	2.1	.9	1.3	3.0	1.1	-.1	.9	1.6	1.3
School D	2.8	.8	1.2	1.3	1.4	2.1	2.0	1.9	1.8

Influence of Home Factors

Teachers of the three experimental schools were asked to provide a brief description of each of their children's home circumstances. Information requested consisted of (1) parents' educational level (2) attitude of parents toward the schools (3) occupation of father (4) family composition and organization (5) community involvement. Three raters, all professors of education at the University of Northern Iowa, were asked to rate the children's home circumstances as being 'favorable' or 'unfavorable'. The raters were told to consider a home favorable if it was organized, provided adequate food, shelter and clothing, and if the parents or parent appeared to administer consistent discipline. Of the 28 children for whom teachers prepared statements the three raters unanimously agreed on the classification of 17, and disagreed concerning 11. Nine Ss were judged to have favorable homes, eight unfavorable.

Home conditions, as appraised by the teacher seemed to have little influence on the children's gain scores. Children from 'favorable' homes

achieved seven higher and six lower scores than their counterparts from 'unfavorable' homes. By sex, the breakdown found boys from 'favorable' homes acquiring higher scores on six subtests, lower on six; for girls the breakdown was seven and four respectively, which does suggest that subsequent research might find that the homes of EMH girls play a greater role in learning than the homes of EMH boys.

These results, suggest that conditions within the home have little to do with a child's learning in the classroom and run contrary to other reports in the literature concerning the influence of the home on cognitive growth.(13, 14, 15) *Subsequent research may find that there is less merit to stressing home-school collaboration with EMH children than with children who are found by school psychologists to be cognitively functioning above the EMH level.*

Summary

The most apparent conclusion to draw from this study is that anticipated, but localized, cognitive gains are unlikely to be produced with a population of EMH children through experimental manipulation of a single curriculum variable for approximately twenty-five minutes daily during one academic year. There is, however, evidence that more complex forms of cognitive behaviors were elicited in the experimental classrooms, and significant cognitive changes, related apparently to experimental conditions are noted. The larger number of average subtest scores attained on post-testing seems especially significant and warrants further investigation. Involvement of a larger RESA type educational unit might find that specific changes are possible in an experiment which is conducted over a longer period of time. A larger, RESA type, study offers the advantage of a larger N which would permit matching of children on the basis of CA and sex. At the same time sufficient children could be involved so that teacher and parent effect might be cancelled out through the Law of Large Numbers.

As it now stands, this study reveals the inter and intra-child cognitive differences obtained with a rural population of children attending an EMH classroom. The findings suggest that

1. *The curricula of EMH children should take into consideration the child's sex as well as quasi-unique pattern of abilities. On a number of tests, boys' scores clustered at both ends of the class curve and the curriculum should be prepared to take this into account in individualizing instructions.*

2. *On the lower elementary level, the EMH teacher must be prepared to provide experiences ranging from prereadiness to formal learning. The problem of educational strategies is made still more difficult by the fact that a child may possess unusual skills in one area, striking weaknesses in other areas.*

3. With rural Caucasian EMH children, the cognitive profile frequently includes higher scores in BD and OA, lower scores in D Sp and PA.

4. The curriculum requirements vary greatly from one EMH classroom to another, and this appears to increase the value of thorough psycho-educational diagnosis. The EMH curriculum should typically emphasize a rather narrow band of experiences on certain tasks and a broad band of experiences on other types of tasks.

5. In general, some types of experiences (such as subtest II and III of the Frostig Test) deserve strong emphasize while others (Frostig subtest I, for example) can apparently be omitted or provided only for a few children.

6. Running throughout this study is the very real danger of children perceiving themselves as "retarded" and responding accordingly. Perhaps the concept of EMH classrooms should be reconsidered and reassessed through longitudinal research. Future research might include the placement of experimental children (who obtain at least two subtest scores in the average range) within regular classrooms while control children would remain in EMH classrooms. While such a step seems revolutionary, it is consistent with the summary of the Canadian-U.S. Study Group on Mental Retardation which recently recommended that EMH children should not be separated but should be placed in the educational mainstream.(16) *Our own conclusions are somewhat more moderate, and suggest that substantial numbers of EMH children might be better served if they were not in segregated educational facilities for "retarded" children.*

7. Finally, the increase in the number of children who achieved at least one average SS on the WISC scores supports the evidence that behaviors of a substantial number of EMH children are part of a complex response pattern stemming from a low task-success ratio.(17) *The children who participated in this project presumably were given more individual attention; this may have raised the incidence of success and explain some of the observed shifts of cognitive profiles. In any subsequent research it would be instructive to learn whether "retarded" children's testing scores increase as the success ratio increases and the failure ratio declines, as well as the role apparently played by sequential experiences within the classroom and maturation in the development of specific skills. The results also suggest that focused and sequential classroom enrichment may play a much more relevant role in certain spheres of learning than in others.*

References

1. Ashcroft, Samuel as cited in Ap release, Waterloo Courier, concerning President's Committee on Mental Retardation, April 24, 1970.

2. Kirk, S. and Paraskevopoulos, J. The development and psychometric characteristics of the revised Illinois Test of Psycholinguistic Abilities. Urbana: University of Illinois Press, 1969.

3. Scott, R. Social class, race, seriation and reading readiness: a study of their relationship at the kindergarten level. The Journal of Genetic Psychology, 1969, 115, 87-96.

4. Scott, R. Perceptual skills, general intellectual ability, race and later reading achievement. The Reading Teacher, 1970, 23 (7), 660-668.

5. Hunt, J. McV. The challenge of incompetence and poverty Urbana: University of Illinois Press. 1969.

6. Bloom, B. Stability and change in human characteristics. New York: Wiley, 1964.

7. Newland, T. E. and Smith, P. A. Statistically significant differences between subtest scaled scores of the WISC and WAIS. Journal of School Psychology, 1967, 5 (2), 122-127.

8. Cohen, J. The factorial structure of the WISC at ages 7-6, 10-6, and 13-6. Journal of Consulting Psychology, 1959, 23 285-299.

9. Ferinden, W. E. Jr., and Jacobson, S. Educational interpretation of the Wechsler Intelligence Scale for children. Linden, N. J.: Remediation Associates, 1969.

10. Jensen, A. R. Another look at culture-fair testing. Western Regional Conference on Testing Problems Proceedings (T. Shellhammer, Ed.) Educational Testing Service: Princeton, 1968, pp 50-104.

11. Throne, Frances M., Schulman, J. L. and Kasper, J. C. Reliability and stability of the Weschler Intelligence Scale for children for groups of mentally retarded boys. American Journal of Mental Deficiency. 1962, 66, 600-606.

12. Littell, W. The WISC Review of a decade of research. Psychology Bulletin, 1960, 57, 132-156.

13. Scott, R. & Lighthall, F. Relationship between content, sex, grade and degree of disadvantage in arithmetic problem solving. Journal of School Psychology, VI (1), 1967, 61-66.

14. Scott, R. Ceiling Level of a factor in assessing disadvantaged children's abilities, Psychology in the Schools, VI (3), July, 1969, 279-282.

15. Smith, J. E. Cognitive learning of children from two to three years of age. Unpublished master's thesis, University of Northern Iowa, 1970.

16. A P/release, Waterloo Courier, July 6, 1970.

17. Zigler, E. "The retarded child as a whole person." In H. E. Adams and W. K. Boardman III (Eds.) Advances in Experimental Clinical Psychology, Vol. I. NY: Pergamon Press, in press.

18. Prendergast, P. The Elementary School Journal, December, 1969, 135-141.

APPENDIX A

Summary of Curriculum Program at the Four Schools
Donald C. Muller
Consultant, Special Classes, Clayton, Delaware, Jones Counties (Iowa)

Constant features of the three experimental programs are:

1. Curriculum Guide
2. Houghton Mifflin Modern Math

1969-1970 Curriculum Materials Used in School D
Primary Level

Stanwix House Reading Series:

Scott Behnke used "Steps to Reading" and "Getting Ready to Read" workbook. Rest of group read from A-2 to D-2 levels, except Jeff Seeley who read A-2 to E-2.

Math - Houghton Mifflin "Modern School Mathematics, Structure and Use", Kindergarten level.

Phonics - Houghton Mifflin "Learning Letter Sounds".

Junior Listen, Hear Program, Follett:

This is a gross listening program leading into consonant discrimination. It is fun, appealing; involves much pupil participation.

Peabody Language Development Kit: Level I.

Tri-County Curriculum Guide for EMR's:
Primary through Intermediate I levels.

As for perceptual motor coordination and development, the foundation was laid in 1968-1969 by using "Parkinson Program for Special Children" by Goldstein. In fact, all lessons throughout the curriculum are oriented toward this goal in that:

1. Close listening is stressed.
2. Observation of printed materials as "put your finger", "move your marker", etc.
3. Kinesthetic Development:
   Trace.
   Write in air.
   Close your eyes and say the letters, etc.
   We have even used sand paper or felt letters or numbers where needed, and used sand for writing in with our fingers, etc.

It is felt that the whole group has profited by being so evenly geared in ability and age, making a closely knit group for activities.

1969-1970 Curriculum Materials Used in School A
Primary Level

"Programmed Reading" - Webster Division McGraw Hill Book Company.

"Readiness Seatwork" - McGraw Hill.

"Working With Numbers" - Steck Vaughn Company.

"Modern School Mathematics" - Houghton Mifflin Company.

"Kindergraph" - Follett Company.

"My First Seatwork" - McMillan Company.

"Time for Phonics" - McGraw Hill.

"Count 5" - McGraw Hill.

Also, "Sesame Street" on television.

1969-1970 Curriculum Materials Used in School B
Primary Level

Reading - Houghton Mifflin.

Readiness - "Tip", "Tip and Mitten", "Big Show", pre-primers, and "Jack and Janet" Book 1.

Science I - "True Books of Sounds We Hear", "Rocks and Minerals", "Insects".

Nature Series (12)
This was taken from Encylopedia Brittannica - Benefic Press Series.

Social Studies - Curriculum Guide for EMR Primary.