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ABSTRACT

The utilization of non-professional personnel as language teachers was investigated using forty residents and an equal number of controls who were matched on the variables of CA, IQ, and Language Age (mean CA 13.28 and mean IQ 33). Two former psychiatric aids were trained as language developmentalists by classroom experiences, informal discussions and reading material pertinent to language acquisition. The language aids were provided with appropriate language development materials and supervised by a speech pathologist. A token reinforcement system was used in all classes. Results showed the children attending language classes made significantly greater raw score gains in the Illinois Test of Psycholinguistic Abilities than did the control group (CG) over the 18 month period. Significantly greater gains in IQ scores were made by the Language Training Group; their mean pre to post IQ score gains were 3.64 points compared to .22 points for the controls. Results suggested greater use of nonprofessional persons in the education of retarded children, while utilizing professionals as consultants. Lesson plans for this project can be found in EC 004 827. (Author/WW)

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FINAL REPORT

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A LANGUAGE DEVELOPMENT PROGRAM
FOR MENTALLY RETARDED CHILDREN
(Volume I of II Volumes)

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August, 1969

Department of Health, Education, and Welfare

U.S. Office of Education
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A LANGUAGE DEVELOPMENT PROGRAM
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Department of Health, Education, and Welfare

U.S. Office of Education
Bureau of Education for the Handicapped

TABLE OF CONTENTS

Summary	1
Chapter I: Background of the Study	3
Institutionalization and Language Development	3
Utilization of Non-professional Personnel as "Language Developmentalists"	5
Language Development Studies Using the PLDK	7
Description of the Research Project	9
Chapter II: Description and Methodology	11
Setting	11
Experimental Design and Subject Characteristics	11
Description of the Language Development Classes	14
Token Reinforcement System	18
Chapter III: Results and Analyses	21
Results of the First Nine Months Using Four Experimental and Control Groups	21
Final Results Comparing the Total Experimental and Control Groups at Nine and 18 Month Periods	25
Supplementary Evaluation of the High and Low Level Classes	32
Chapter IV: Discussion	33
Problems and Deficiencies of the Project	38
Recommendations	39
References	
Appendices	

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Summary

This project was undertaken to determine if non-professional persons could effectively function as "Language Developmentalists" for small groups of children primarily falling in the severely retarded range. The utilization of non-professional personnel serving as language teachers was conceived as one approach in providing more intense speech and language training to a larger segment of the institutional population. The research covered approximately 18 months of language training. The project was undertaken in a state residential institution housing 400 residents, many of whom have concomitant sensory and motor disabilities.

Forty residents were initially selected for participation in the program. An equal number of children served as controls matched on the variables of CA, I.Q., and Language Age. The mean CA for the total group (Language Training and Control) was 13.28 years. The mean I.Q. for the two groups was 33. The experimental edition of the Illinois Test of Psycholinguistic Abilities and the Stanford-Binet Intelligence Scale were administered to both the Language Training and Control groups prior to the start of the program and at the following 9 and 18 month intervals. The Vineland Social Maturity Scale and Mecham Verbal Language Development Scale were administered prior to the program and during the final (18 month) testing period.

Two former Psychiatric Aides were trained as the "Language Developmentalists." The major part of their training took place in the classroom where they were teaching. This was supplemented by informal discussions and readings pertaining to speech and language problems of the mentally retarded, operant learning theory, the role of a language developmentalist, and a short survey of language development materials. The language teachers were provided with appropriate language development materials and supervised during the course of the study by a certified Speech Pathologist serving as the Project Director. One teacher was assigned to twenty children comprising the "low" level classes, the other Language Developmentalist was assigned to twenty children comprising the "high" level classes. Four to six children participated in each class. The classes met daily for approximately one hour. The Peabody Language Development Kits (Levels #1 and 2) were used for the four high level classes. A series of daily lesson plans was developed during the course of the project for use with the four low level classes. A token reinforcement system was used in all classes to reinforce appropriate responses to the materials. The tokens were exchanged for a variety of foods and objects.

Results showed the children attending language classes made significantly greater raw score gains on the ITPA than did the

matched Control Group over the 18 month period. The mean pre to post raw score gain on the ITPA was 20.41 points for the Language Training Group and 8.25 points for the Control Group. Significantly greater gains in I.Q. scores were made by the Language Training Group when compared to the Control Group at the 9 month interval. Overall pre to post (18 month) gains, in favor of the Language Training Group, did not quite reach the required .05 level of statistical significance ($P < .07$). The mean pre to post I.Q. score gains for the Language Training Group was 3.64 points as compared to .22 points for the controls. No differences between groups were found on the Vineland Social Maturity Scale or Mecham Verbal Language Development Scale.

Results obtained from the research generally support the position that non-professional persons can be trained to effectively function as Language Developmentalists for severely retarded institutionalized children. This finding should have a significant and advantageous impact on the training and education of institutionalized children. Results from the program point to the need to make greater use of non-professional persons in the formal education and training of retarded children, while utilizing professional persons more as consultants and supervisors to large scale programs involving a significantly greater number of the residential population.

CHAPTER I BACKGROUND OF THE STUDY

Mentally retarded children are beset by various and numerous behavioral deficits, none of which is more pervasive and debilitating than delayed or inappropriate speech and language development. Numerous authors have noted the lag in language development among retarded children (Kirk and Johnson, 1951; Karlin and Strazzula, 1952; Travis, 1957; Van Riper, 1963). McCarthy (1964) cited statistical and experimental evidence demonstrating a causal relationship between language development and intelligence. Other studies have shown the impaired ability of retardates to perform on intellectual tasks requiring important language skills (Milgram and Furth, 1963, Siegel, 1957, Griffith and Spitz, 1958; Griffith, Spitz, and Lipman, 1959; Papania, 1959, Badt, 1958). Several authors have noted that the delayed speech and language skills among the mentally retarded constitute a major impediment to their social, emotional, and vocational adjustment (Schiefelbusch, Copeland, and Smith, 1967). There is also evidence indicating that adult interaction with the mentally retarded is differentially related to the language development of the child (Siegel and Harkins, 1963; Siegel, 1963). New diagnostic instruments such as the Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1963) and Parsons Language Sample (Spradlin, 1963) have encouraged both educators and psychologists to attend more closely to the speech and language characteristics of the mentally retarded.

Yet, in comparison to other behaviors, the linguistic and communicative problems of the retarded have not received the therapeutic and remedial attention deserving of their importance. Efforts so far have primarily evolved around the identification, measurement, and analysis of the speech and language deficiencies of the mentally retarded. A selected bibliography by Peins (1962), for example, cites 128 references to speech, hearing, and language problems of the retarded. It would appear that speech and language specialists have been too much concerned with the microscopic analysis of speech deviations among the retarded. As such, therapeutic efforts have been mainly directed towards the amelioration of specific speech defects. On the contrary, there have been only a minimal number of studies reported wherein efforts have been directed towards large scale remedial programs for enhancing the more global psycholinguistic skills of the retarded.

Institutionalization and Language Development

The need for large scale language development programs is most critical in our residential centers for the mentally retarded. In many cases the institutional environment seriously jeopardizes the

acquisition and maintenance of communicative skills among the resident population. The effects of routinized living conditions, a low adult-child ratio, inadequate peer models to imitate, and insufficient reinforcement for verbal behavior may all contribute to an arid climate for speech and language growth.

A survey by Spradlin (1963) indicated that speech deficits in institutionalized mental defectives ranged from 57 to 72 per cent. More specifically, Lyle (1959) used the Minnesota Preschool Scale of Intelligence to demonstrate that institutionalized severely retarded children had significantly lower verbal intelligence scores than did day-school severely retarded children, even though there were no differences between groups on nonverbal indices of intelligence. Lyle suggested this discrepancy was due to the retarded ability of institutionalized mental retardates to use and comprehend speech or to think in verbal terms.

Badt (1958) administered the vocabulary list of the Stanford-Binet Intelligence Scale to 60 institutionalized mental retardates and made a qualitative analysis of their definitions. She found a negative correlation of $-.61$ between length of institutionalization and abstraction scores. Similarly high correlations were obtained even when MA and CA were partialled out. Badt concluded, "This evidence seems to show that length of time spent by the subject in the institution strongly affects the level at which they define and manipulate concepts. The longer the time of institutionalization, the lower in abstracting ability." (p. 246)

Schlanger (1954) compared mean sentence length among 21 retarded children living in an institutional environment with 21 children living at home. The home group scored significantly higher on mean sentence length and words per minute. Schlanger noted that, "the institutionalized child is deprived of certain motivational factors affecting speech through the severance of significant familial relationships, the lack of challenge offered in routinized living and the constant companionship of peers which minimize his speech experiences and practice." (p. 339)

The Differential Language Facility Test was used by Sievers and Essa (1961) in comparing institutionalized retarded children with those living in the community. These investigators found the community group scored significantly higher on five of the eight subtests. Additional results from this study indicated that although the children living in the institution had a higher mean verbal output, they were more repetitious.

In essence, these studies point to the need for workers in institutions to intensify their efforts in developing communicative abilities among mentally retarded residents. If, in fact, the role of the institution is to prepare the mentally retarded child for eventual return to the community, then even more emphasis

is needed in those areas necessary for societal adjustment. Language development is prominent among those key areas necessary to make this transition. To be effective, such training must be intense and systematic. It should not be subsumed under other educational and training activities. On the contrary, language development must constitute a major therapeutic endeavor in and of itself.

Utilization of Non-professional Personnel as "Language Developmentalists"

There is almost traditionally a lack of qualified professional personnel in institutions to plan and implement comprehensive language programs. For example, at the Kansas Neurological Institute there is only one position currently allocated for a speech specialist. And even more despairing is the fact that this one individual must provide audiological testing, language diagnoses, and speech therapy for a population of approximately 400 residents plus additional diagnostic services for an out-patient evaluation unit attached to the institution. Although the hiring of additional speech pathologists and speech clinicians might, to some extent, alleviate this inadequate staffing, there is a more central point in question. Speech specialists are primarily trained to identify and correct specific speech deviations. Yet many retarded children, because of their delayed language development, are not ready for the skilled services offered by such specialists. Many of these children are more in need of a speech readiness program to give them the background training necessary for effective communication. Some of these children have language ages far below their mental age levels. Also, there are older and more capable children who have the rudimentary skills for effective communication but who need a systematic program designed to further develop these skills. This type of child must be provided with enriched linguistic opportunities. He should be given the stimulation and experiences necessary for vocabulary expansion. And, most important, the use of oral language needs to be made an enjoyable and rewarding experience.

Several authorities on speech and language problems of the mentally retarded have indicated the need for general language development programs (Batza, 1956; Plotkin, 1959, Riello, 1958; Schlanger, 1958; Smith, 1962). Harrison (1959) has advocated the naming of speech specialists for the retarded as "language developmentalists." Accordingly, these writers have agreed that speech specialists in the area of mental retardation should assume the role of language developmentalists. It would also seem fruitful if nonprofessional workers who, under the guidance of speech specialists, could be trained to take the role of language developmentalists. The utilization of non-professional personnel to carry out such a program would greatly augment the number of children who could be included in a developmental pro-

gram since, as was previously mentioned, institutions are often deficient in trained speech specialists. A similar suggestion was made by Schlanger (1958) who advocated the use of speech personnel working in institutions to direct speech correction and motivational work in education and training programs. Shubert and Fulton (1966) have described an inservice training program for hospital attendants and nurses. The speech specialists in this setting instructed these employees on various aspects of linguistic development and methods of establishing communication skills among the retarded.

However, the feasibility of employing non-professional personnel to effectuate language stimulation programs for mentally retarded children residing in institutions precipitates other questions. What type of language development program is needed? What materials and techniques are necessary and/or available to implement such a program?

Those workers concerned with language development of the mentally retarded have frequently described situational or opportunistic programs. Plotkin (1959), for example, presented a situational speech therapy program for trainable cerebral palsied children which presupposes an ongoing program of physical, recreational, and occupational therapy. The speech therapist in such a setting unobtrusively intervenes in the daily activities of the child and attempts to encourage the child to orally or gesturally express his desires and wishes in these various situations. Other speech specialists (Freeman and Lukens, 1962; Rittmanic, 1958; Harrison, 1959) have described similar opportunistic speech programs for the classroom. There is certainly much value in these types of situational approaches; however, language development per se is of somewhat secondary importance.

Schlanger (1958) has presented an opportunistic speech therapy program where primary emphasis is on the development of linguistic skills. He notes it is not feasible to base speech therapy with the retarded on sound analysis, drills, and the manipulation of articulators. Schlanger advocates a non-directive speech-in-use program founded on pleasant and meaningful associations. Karlin and Strazzula (1952) have accentuated this point of view when they, in reference to the mentally retarded, stated, "The basic principle of speech therapy is not the attainment of 'perfect' speech, but the development of everyday language needs." (p. 294)

An intensive language development program with severely retarded Mongoloid children has been reported by Kolstoe (1958). The experimental group in his study received individual language instruction of 45 minutes' duration, five days a week, for five and one-half months. Results indicated the experimental group made significantly greater IQ gains and greater improvement on

the Illinois Language Test than did the control group. Children with IQ's over 25 benefited most from the program.

Of critical importance is finding the type of programmed materials which could be used by non-professional personnel. Accordingly, the Peabody Language Development Kits (Dunn and Smith, 1965, 1966, 1967; Dunn, Horton, and Smith, 1968) appear to be appropriate instruments to be used by persons who have not had specialized training in the area of speech and language. The unambiguous and systematically organized daily lesson plans presented in these kits can be easily understood and implemented by individuals lacking a professional background in speech development. Moreover, this instrument is specifically designed to enhance linguistic and communicative skills for disadvantaged and mentally retarded children demonstrating delayed development in these areas. The Peabody Language Development Kits (PLDK) appear exceptionally appropriate for institutionalized retardates who manifest both delayed language development and restricted environmental opportunities.

Language Development Studies Using the PLDK

Smith (1962) used materials from the PLDK (Level #1) in a three-month language development program for 16 educable mentally retarded children enrolled in special classes. These pupils were matched with a control group on CA and over-all language age. Effects of the experimental program were measured by the Illinois Test of Psycholinguistic Abilities (Kirk and McCarthy, 1961). Results from this study found the experimental group gained an average of 6.75 months in language age while the control group showed a mean loss of .4 months. The experimental group made observable gains in each of the nine sub-tests of the Illinois Test of Psycholinguistic Abilities (ITPA). The control group showed unchanged or decreased subtest mean scores on five of the nine sub-tests with minimal gains in the remaining four. Neither IQ scores nor initial language age were significantly related to language gains. Data confirmed the major hypothesis of the study that a planned language development program would enhance the language ages of educable mentally retarded children.

A follow-up study of these children approximately 13 to 14 months after the time of original testing (Mueller and Smith, 1964) found that the experimental group still scored higher on the language age measure, yet these differences were no longer statistically significant. These authors suggested that a longer period of training may be required to achieve more lasting differences.

Blessing (1964) used the PLDK (Level #1) in a four-month group language program with 20 experimental subjects matched with 20 control subjects. The experimental subjects were taken from their special classes in groups of 3 to 5 and taught for 45 minutes, three times a week by female student teachers in

special education. The ITPA vocal encoding scores of the experimental group were measured to be significantly higher than the control group following this short-term program. A follow-up study two years later by Weld (1964) again found, however, that these differences tended to decrease.

A comprehensive study by Dunn and Mueller (1965) involved 734 disadvantaged children divided into ten experimental groups and 150 control subjects. Group 1 received the Initial Teaching Alphabet (ITA) taught by the regular teacher; Group 2 received the ITA plus the PLDK (Level #1) taught by the regular teacher to the total class at one time; Group 3 received on the PLDK taught by the regular teacher; Group 4 received the PLDK from the regular teacher who taught first the bright half of the class and then the slow half; Group 5 received the PLDK, taught to the total class by the regular teacher plus an itinerant teacher working as a team; Group 6 was taught the PLDK by team teachers taking first the fast and then the slow half of the class; Group 7 received the PLDK taught to the total class by an itinerant teacher; Group 8 received the PLDK from an itinerant teacher who taught first the fast and then the slow half of the class; Group 9 received the PLDK taught to the total group by the regular teacher assisted by community volunteers; and Group 10 received the PLDK, taught first to the fast and then to the slow half of the class by the regular teacher assisted by a community volunteer.

Tentative data after one year of this three-year project indicated that the language development of children receiving solely the PLDK lessons was significantly greater than those receiving the ITA plus the PLDK, ITA only, or controls.

In intellectual development, children receiving the PLDK plus the ITA made greater gains over those receiving the PLDK alone, ITA alone, or controls. In school achievement, children receiving the PLDK plus ITA made significantly greater improvement over the ITA group alone, the PLDK group alone, or controls. The size of the group and number and nature of instructors has, up to the time of the tentative evaluation made no measurable differences in the results.

Ensminger (1966) used the experimental version of the PLDK (Level #1) with two classes of slow learning children who were administered the daily lessons by the classroom teacher. Other classes of slow-learning students served as controls for this study. The subjects ranged in age from six to ten years, had IQ scores from 70 to 90, and were taught one lesson a day for the first seven months of the school year. Language age measures from the ITPA showed the experimental group to gain eight months as compared to five months for the controls. This difference was not statistically significant. However, when the groups were divided into those subjects with mental ages below

six and one-half years and those above this age, it was found that the low mental age group made significant gains over the controls, whereas no differences were observed between the high mental age groups.

A short language development program was conducted by Blue (1963) using trainable mental retardates. He followed the exact procedures as did Smith (1962) for educable retardates except lessons in Blue's study were taught by a certified speech therapist rather than an educational language developmentalist. Subjects ranged in CA from eight to 17 years and had measured IQ's between 25 and 55. For instructional purposes, the experimental subjects were divided into two groups based on chronological age. During the 11-week treatment period, thirty-three 45-minute sessions were administered. Subjects in the experimental groups gained 5.67 months on the ITPA while the control group gained 3.67 months. These differences were not found to be significant. However, the younger subjects were found to make significantly greater gains (8.33 months) than did the older CA group (3 months). Several possibilities were suggested to explain these findings: (1) the lessons may have been inappropriate for the older subjects; (2) the older subjects may have been more severely retarded; or (3) the treatment time may have been too brief for severely retarded children.

In general, studies from the PLDK are most encouraging. While the gains observed in these studies have tended to be temporary, it may well be that programs of longer duration will provide more lasting improvement.

Description of the Present Research Project

The purpose of this project was to implement an extensive language development program for severely, moderately, and mildly retarded children and adolescents residing in a state institution. The program was intended to increase everyday language usage. Emphasis was placed on the more global and functional aspects of speech and language with minimal concern for specific speech deviations. Basic to the program was the employment of non-professional personnel to serve as "language developmentalists" for small groups of retarded children who met daily in a classroom setting for language training. Classes met for approximately one hour each day. The language developmentalists, under the supervision of a Speech Pathologist, were trained to use prescribed language development materials for a "high" mental age group and a "low" mental age group.

Standardized psychometric instruments were used to evaluate the program using appropriate experimental and control groups. These instruments were administered prior to the start of the program and at 9 and 20-month intervals thereafter.

Educationally, it was hoped the following goals could be

demonstrated or accomplished during the course of the project:

(1) Non-professional persons can effectively function as language developmentalists for retarded children and, thus, appreciably enhance the number of children participating in language development programs in our residential centers;

(2) The Peabody Language Development Kits can be successfully used with institutionalized retarded children;

(3) New language materials and procedures can be developed and tested for use with low functioning retarded children.

CHAPTER II DESCRIPTION AND METHODOLOGY

Setting

The study was carried out at Kansas Neurological Institute (KNI); one of three major institutions in Kansas for the treatment and care of the mentally retarded. KNI houses 400 residents ranging in age from approximately three to 25 years of age. The mean chronological age for the resident population is about 13 years. The majority of these children and adolescents fall in the severely retarded range. Many of them have concomitant motor and sensory disabilities.

Experimental Design and Subject Characteristics

Forty residents participated in the language development program with an equal number of residents (40) serving as matched controls. Original matching of the subjects was based on chronological age, I.Q., language age, and sex. During the first nine months of the program it was possible to utilize regular Special Education classes at KNI as an additional control group. This desirable arrangement of experimental and control groups could not be held during the second year of the project. A high turnover among Special Education teachers at KNI unavoidably shifted students around who had originally been placed in one of the Special Education class control groups (i.e. children who should have remained in class were sometimes dropped and vice versa). Nevertheless, the Special Education control groups were adequately maintained through the first nine months of the project; at which time an evaluation was made. Accordingly the experimental design and subsequent results of the first nine months of the project will be reported separately from the overall evaluation covering approximately 18 months.

Subject Groups and Experimental Design for the first nine months. Four experimental and control groups were used during the first nine months of the project. Subject characteristics of these four groups are presented as Table 1.

Table 1

Subject Characteristics of the
Experimental and Control Groups

Group	Total N	Chronological Age		IQ		Mental Age	
		Mean	Range	Mean	Range	Mean	Range
I. Language Training and Special Education	17	12.17	8-16	39	17-58	4.58	2-7
II. Language Training Only	23	13.19	4-18	29	14-54	3.52	2-5
III. Special Education Only	17	13.48	10-17	36	15-57	4.72	2-8
IV. Neither Language Training Nor Special Education	23	14.29	6-17	30	16-61	4.10	2-7
Total Language Training (Groups I and II)	40	12.75	4-18	33	14-58	3.95	2-7
Total Control (Groups III and IV)	40	13.95	6-17	33	15-61	4.35	2-8
Total Groups	80	13.28	4-18	33	14-61	4.23	2-8

Group I: Language Training and Special Education. This group was composed of 17 children who received both Language Development training and regular Special Education at Kansas Neurological Institute. Special Education classes were held daily, and met for approximately one hour. Most of the Special Education classes contained five to seven children. The classes were taught primarily by certified Special Education teachers on the regular staff at KNI.

Group II: Language Training Only. This group of 23 children received daily language training (to be described in later sections) but they did not attend Special Education classes.

Group III: Special Education Only. The 17 subjects in this group attended daily classes in Special Education¹ but they did not attend Language Development classes.

¹Two of the children in this control group attend regular Special Education classes in the community.

Group IV: Neither Language Training nor Special Education.

The 23 children in this group attended neither Language Development nor Special Education classes. The majority of them did participate in other therapeutic activities within the institution such as occupational therapy, recreational therapy, workshop, chapel classes, etc. (It should be noted that many children in the other three groups also attended these activities).

Measurement Instruments. The Stanford-Binet Intelligence Scale (Terman and Merrill, 1960) and Illinois Test of Psycholinguistic Abilities, Experimental Edition (McCarthy and Kirk, 1961) were administered to all subjects prior to the start of the program and after nine months. These instruments were administered by members of the regular Psychology staff working at Kansas Neurological Institute.

Subject Groups and Experimental Design for the Total Project (18 months). A separate analysis was made between the forty children participating in the language development program and the total control group for an 18-month period. Subject characteristics of the total Language Training and Control Groups can be observed in Table 1. Progress was measured for the two groups at nine and 20-month intervals using the Stanford-Binet and ITPA. (As previously mentioned, these two instruments were also used to evaluate progress during the first nine months of the project using the Special Education classes as an added control group). In addition, the Vineland Social Maturity Scale, (Doll, 1947) and the Mecham Verbal Language Development Scale, (Mecham, 1958) were administered to all 80 subjects prior to the start of the project and at the final 18-month testing period. These two instruments were administered by the staff psychologists in consultation with the ward attendants.

Table 2 provides a summary indicating what tests were administered to the experimental and control groups for the nine and 18-month intervals.

Table 2

Summary of Psychological Tests Administered
to the Various Experimental and Control
Groups at 9 and 18-Month Intervals

Subject Groups	Tests Administered			
	Stanford-Binet	ITPA	VSMS	Mecham
I. <u>First Testing Period: Prior to the start of the project (80 subjects)</u>	X	X	X	X
II. <u>Second Testing Period: 9-months later</u>				
<u>Group I: Language Training and Special Education (17)</u>	X	X		
<u>Group II: Language Training Only (23)</u>	X	X		
<u>Total Experimental: Groups I and II (40)</u>	X	X		

<u>Group III: Special Education Only (17)</u>	X	X		
<u>Group IV: Neither Language Training nor Special Education (23)</u>	X	X		
<u>Total Control: Groups III and IV (40)</u>	X	X		
III. <u>Third Testing Period: 18-months later</u>				
Total Experimental (40)	X	X	X	X
Total Control (40)	X	X	X	X

Description of the Language Development Classes

Training the Language Developmentalists. Two women were hired at the start of the project to work as language developmentalists. Both of them had previously worked as Psychiatric Aides at KNI. Their formal training prior to the project consisted of a high school education plus a six-week training course for Psychiatric Aides offered at the Kansas Neurological Institute.

The two language developmentalists were provided with an informal training period lasting for approximately one month at the start of the project. Most of the training consisted of reading assignments and discussions with the Project Director and one of the Principal Investigators. The training provided for the two Language Developmentalists was broken down into the following three phases:

Phase I: The Role of a Language Developmentalist. During this phase of the training, attention was directed towards the definition of a language development teacher. Emphasis was placed on their role in the project and what they were supposed to teach. The more global aspects of speech and language were stressed. It was necessary to delineate, as much as possible, the difference between speech correction and speech development;

Phase II: Speech and Language Development Problems of the Mentally Retarded. A short survey of normal language growth and development was included during this phase of the training with an emphasis placed on the delayed language problems of the mentally retarded. Basically, an attempt was made to point out to the teachers the fact that most retarded children develop speech and language skills at a slower rate than normal children, yet they progress in the same sequence. The relatedness of speech and language skills to other areas of social, intellectual, and vocational growth was also covered during this phase of the training;

Phase III: Materials and Teaching Techniques. The specific materials to be used in teaching were reviewed during this phase of the training. The teachers were exposed to a variety of language development materials that were to be used in the classrooms. They were also trained to operate the tape recorder in conjunction with the use of certain materials. A short course in the use of operant conditioning techniques was also covered at this time in preparation for the implementation of the token reinforcement system.

A major part of the training program for the language developmentalists was undertaken in the classes, once the program was started. The Project Director observed the teachers during various class periods and made suggestions on how to improve their teaching techniques. This type of observation was especially beneficial and important when the token reinforcement system was started.

The Project Director and classroom teachers met daily during the course of the study. Specific problems concerning materials, behavior disruptions, etc. were discussed at these meetings.

A total of four language developmentalists participated in the project at some time during the 18-month period. The two original teachers left the program after six and 12 months respectively. Training for the replacement teachers was considerably less extensive than for the two language developmentalists originally hired for the project.

Composition of the Language Classes. The forty residents participating in the language development program were assigned to either a "high" or "low" level group. Those residents placed

in the "high" level group had an average mental age of around 5 years (range 3-9 to 7-8) and a mean I.Q. of 39 (range 21 to 58). This group had an average chronological age of 14.7 years with a range from 11 years 9 months to 17 years 9 months. Those children assigned to the "low" level group had an average mental age of 2.75 years (range 1-11 to 3-11) and a mean I.Q. of 26 (range 14 to 62). The average chronological age for the low level group was 10.8 years (range 4-1 to 16).

One language developmentalist was responsible for teaching the twenty residents in the high level group; the other language teacher was assigned to the 20 children in the low level group. Within each of the two group levels (high or low), the residents were further divided into small classes ranging from four to six children each. Accordingly, each of the language developmentalists taught four classes a day. Grouping of the classes within the high or low levels was primarily determined by chronological age. Each of the language classes met for approximately one hour daily.

Special Sensory and Motor Disabilities. Children attending language classes had varying degrees of sensory and motor disabilities, as are commonly found among severely and profoundly retarded children. One student in the high level group was quadriplegic. Two of the students suffered severe hearing losses requiring special adaptations in the classroom setting. Two participants in the program were legally blind; again requiring special consideration from the teacher. All but one of the students had at least a minimal amount of speech, even though several had command of just a few words.

Physical Characteristics of the Classrooms. Two average size classrooms were used in the project. Both classrooms were housed in a small building adjoining one of the main ramps at the center of the institution. Each room was equipped with a chalk board and a chalk ledge running the entire length of the front of the room. The chalk ledge, used for placing pictures, was adjusted to accommodate the heights of the children in the low and high level classes. The two rooms were further equipped with large storage cabinets, chairs of varying sizes, a desk for the teachers, and several small tables. Book cases were used to display a variety of objects and sweets needed for the token reinforcement system. Tape recorders, overhead projectors, and a slide projector screen were available to the teachers in the classrooms.

Teaching Materials Used in the Program. The teaching materials used for the "high" and "low" level groups were different and, accordingly, are reported separately.

High Level Classes. The four classes in the high level group were taught successively from the Level #1 and Level #2 Peabody Language Development Kits (Dunn and Smith, 1965, 1966). The Level #1 Kit was completed approximately eleven months after the start of the program. About one-half of the daily lesson plans in the Level #2 Kit were taught by the final testing period. For the most part, the materials in these two kits approximated the capabilities of the students in the four high level classes. Some minor revisions were made by the classroom teacher and Project Director on some of the lesson plans. Basically, these alterations were made to simplify certain portions of the lesson or to make it more appealing to the students.

Low Level Classes. Finding materials and lesson plans suitable to the capabilities of the four low level classes proved to be much more difficult. Initially, lesson plans were used from the experimental edition of the Pre-School Language Development Kit (Dunn, Horton, and Smith, 1968). For the majority of children in the low level classes, however, materials in the Pre-School Kit were too advanced. Attempts to simplify the lesson plans in accordance with the abilities of these children were, for the most part, unsuccessful. At this point it was necessary to re-evaluate the goals for the low level classes and establish in order of precedence, those areas in most need of remediation. It was decided by the Project personnel that future lesson plans for the majority of children in the low level classes should concentrate on the following areas:

(1) Encouraging the children to emit more verbal behavior during the class periods. It was especially desired that the students use speech more in communicating with one another. During the initial months, most of the verbal interchange took place between teacher and child and not between peers in the classroom;

(2) Increase their productive vocabulary including nouns, action verbs, adjectives, and prepositions;

(3) Increase their response length in an attempt to develop the use of phrases and short sentences rather than the typical one word response used by most of these children;

(4) Further develop their attentiveness to auditory stimuli and enhance their ability to discriminate between sounds;

(5) Provide them with classroom experiences which would help them realize the functional importance of speech in adapting to their environment. In conjunction with this goal it was necessary to minimize the gestural and other nonverbal

forms of communication primarily used by these low level children.

In order to meet the above objectives, it was necessary to develop a series of lesson plans especially tailored to the needs of the low level classes. The Project Director assumed major responsibility for preparing the lessons.

The series of lesson plans developed, numbering over 200, are reproduced in Volume II of the Final Report. Basically, each lesson is usually composed of four sections. The first section, Vocabulary Building Time, is designed to develop both the recognition and productive use of nouns, verbs, adjectives, and prepositions. Five new words or concepts are usually included in each lesson. The children are first required to receptively identify the words, usually represented through pictures, and then they are required to name the word or concept. The second section of the daily lesson, Activity Time, is directed towards acting out various tasks or commands and verbalizing the ongoing activity. The third section consists of Conversation Time in which the students are placed in situations where they are encouraged to talk to each other. Most typically, they are required to give simple commands to one another. The fourth section, which is optional according to the remaining time available, pertains to Sound Discrimination exercises. The children are required to identify and produce various sounds representing phonemes, words, or familiar noises in the environment.

As the lesson series progresses, the activities become more diversified and involved. However, throughout the lesson series an attempt is made to maintain the basic format of presenting the materials while continuing to feed in new information. The lesson plans make optimal use of teaching aids such as tape recorders, overhead projectors, slide projectors, and a variety of different objects.

Except for approximately three months at the beginning of the Project during which a higher functioning class used the PLDK Level-P lessons, at the time of the final testing, the four low level classes had progressed through 200 of the daily lesson plans developed for the Project.

Token Reinforcement System

A token reinforcement system was gradually introduced into all of the eight language development classes approximately six months after the start of the project. Implementation of the token system involved a fairly extensive training program for the language developmentalists in the procedure and techniques of behavior shaping. Most of this training took place in the classrooms, supplemented by informal discussions and reading materials on behavior modification.

The token reinforcement system was utilized in two major ways: to shape and maintain desirable or correct responses to the materials; to reduce maladaptive or disruptive behavior occurring in the classrooms.

Tokens (plastic chips contained in the Peabody Language Development Kits) were dispensed by the teacher for correct or approximated responses by the children, depending on their individual capabilities. The tokens were dispensed immediately after the response occurred. In many cases, tokens were used to shape longer and more elaborate responses by the students. For example, a child may be given one token for correctly labeling a picture of a telephone. However, several tokens may be dispensed to the child if his response included more than one word (e.g. "this is a telephone"). Similarly, in describing a large picture, the child may be given one token for each accurate and separate description of the objects or events in the picture--the more he talks, the more tokens he earns.

The token reinforcement system was also used to control disruptive behavior in the classes. These behaviors included talking-out, out of seat, screaming, pounding feet, playing with furniture, burping, whistling, inappropriate laughter, hitting, pinching, pushing, etc. The tokens were used in two major ways to reduce the frequency of these behaviors. First, the child may be penalized by the removal of one or more chips, contingent on the occurrence of a disruptive behavior. Second, tokens may be given to every other child in class who was not engaged in a disruptive behavior. For example, if one child was inappropriately out of his chair, all other class members would receive tokens for remaining seated.

Felt pockets were pinned on the children when they first entered the classrooms. These pockets measured $4\frac{1}{2}$ " X 6" with a flap sewed approximately $1\frac{1}{2}$ " down from the top, making it easy for the teacher to place in the tokens. The pockets were brightly colored.

In the four low level classes, the tokens were exchanged immediately after class for a variety of sweets and small toys including M & M's, bubble gum, cookies, toy cars, rings, balloons and numerous novelty objects purchased in large amounts from a novelty sales company located in the area. Cost of the various items generally ranged from 1 to 10 chips. As time progressed, larger and more expensive items were requested by the children in the low level classes. In these cases, they were required to save their chips over several days, and possibly weeks in order to purchase the particular item chosen by them.

A different token exchange procedure was used in the high level classes. Tokens earned during class were exchanged at the

end of the period for blue tokens. One blue token was exchanged for 10 non-blue tokens. The blue tokens were then saved until Friday, at which time they were redeemable for a large assortment of sweets and objects displayed in the classroom "store." An exception was made for one class of younger children who had the option of trading each day of the week. Prices ranged from 1 to 100 blue tokens and included such items as candy, balloons, pencils, books, key chains, scarfs, hats, necklaces, socks, balls, pictures of the students, ball-point pens, games, kites, model cars, inexpensive cameras, batons, and a wide variety of novelty items.

The students may have had to save their blue tokens over several weeks to purchase some of the more high priced items. They all kept their blue tokens in the classroom. At the end of each class period they hung their tokens on the wall below a tag with their names. The tokens were interlocking, and could thus be chained together.

CHAPTER III

RESULTS AND ANALYSES

Results of the First Nine Months Using Four Experimental and Control Groups

As stated in the previous section, four experimental and control groups were compared during the first nine months of the project. These groups were: Language Training and Special Education (17); Special Education Only (17); Language Training Only (23); and Neither Language Training Nor Special Education (23). The experimental edition of the Illinois Test of Psycholinguistic Abilities and the Stanford-Binet Intelligence Test were readministered to all 80 children in these four separate groups.

Table 3 shows the results from the ITPA, depicted on the mean total raw score and the mean language age increases for the groups.

Table 3
ITPA Total Score Increases for the Experimental and Control Groups

	Initial Scores		After 9 Months		Increase	
	Mean Raw Language Score	Language Age	Mean Raw Language Score	Language Age	Mean Raw Language Score	Language Age
I. Language Training & Special Education (17)	70.23	3-8	81.76	4-1	+11.53	+5 mo.
II. Special Education Only (17)	73.70	3-10	84.00	4-1	+10.30	+3 mo.
III. Language Training Only (23)	52.65	3-2	61.17	3-5	+8.52	+3 mo.
IV. Neither Language Training nor Special Education (23)	55.74	3-3	61.43	3-5	+5.69	+2 mo.
Total Language Training (40)	60.12	3-5	69.92	3-8	+9.80	+3 mo.
Total Control (40)	63.37	3-6	71.02	3-9	+7.65	+3 mo.

As can be observed from Table 3, those children who received both Language Training and Special Education made the greatest gains on the ITPA. Other groups, following in order of raw score increases were Special Education Only, Language Training Only, and Neither Language Training Nor Special Education. The forty children in the total language training sample (Groups I and III) gained slightly more on the ITPA than did the total control group (Groups II and IV).

A non-parametric statistical test, the Mann-Whitney U-Test (Siegel, 1965), was used to compare ITPA raw score increases between the four separate experimental and control groups. Due to the large number of subjects in the various groups, it was necessary to transform the U-value into a z-score in order to find the level of statistical significance when comparing the groups.

Table 4 presents a comparison of the ITPA score increases between the groups.

Table 4
Comparison of ITPA Score Increases Between the
Experimental and Control Groups

Groups	z-Value	Level of Significance*
Language Training and Special Education <u>vs.</u> Neither Language Training Nor Special Education	1.69	$P < .04$
Language Training and Special Education <u>vs.</u> Language Training Only	.76	$P < .22$ n.s.
Language Training and Special Education <u>vs.</u> Special Education Only	.65	$P < .25$ n.s.
Language Training Only <u>vs.</u> Neither Language Training Nor Special Education	1.00	$P < .15$ n.s.
Language Training Only <u>vs.</u> Special Education Only	.02	$P < .48$ n.s.
Special Education Only <u>vs.</u> Neither Language Training Nor Special Education	.68	$P < .24$ n.s.
Total Language Training (Group I & II) <u>vs.</u> Total Control (Group III & IV)	1.27	$P < .10$ n.s.

*Significance levels computed for one-tailed tests.

The only statistically significant difference is found between the Language Training and Special Education Group vs. the group composed of Neither Language Training Nor Special Education ($P < .04$). ITPA score increases between the Total Language Training Group vs. the Total Control Group show a definite trend in favor of those children attending language classes, but results did not reach the accepted .05 interval of statistical confidence.

Intelligent quotient score changes, as measured by the Stanford-Binet Test, are presented as Table 5.

Table 5
Stanford-Binet I.Q. Score Increases for the
Experimental and Control Groups

	Mean I.Q. Scores		
	Initial	After 9 Months	Difference
I. Language Training & Special Education (17)	38.82	41.82	+3.00
II. Language Training Only (23)	29.43	32.21	+2.78
III. Special Education Only (17)	38.17	40.11	+1.94
IV. Neither Language Training Nor Special Education (23)	30.13	30.08	-.05
Total Language Training (Groups I & II)	33.42	36.30	+2.88
Total Control (Groups III & IV)	33.55	34.35	+.80

Group I, composed of children who received both Language Training and Special Education, demonstrated the greatest I.Q. score increase (+3.00 I.Q. points). The Language Training Only Group closely followed with a mean I.Q. increase of 2.78 points. The Special Education Only Group gained 1.94 I.Q. points during the nine month period. Group IV (Neither Language Training Nor

Special Education) showed a very slight decrease in the mean I.Q. score over the same time interval. The forty children in the Total Language Training Group (Groups I and II) showed a higher mean increase in I.Q. scores than did the forty children in the Total Control Group (Groups III and IV).

A comparison of I.Q. score increases between groups can be observed in Table 6.

Table 6
Comparison of Stanford-Binet I.Q. Score Increases Between the Experimental and Control Groups

	z-Value	Level of *Significance
Language Training and Special Education vs. Neither Language Training Nor Special Education	4.80	$P < .0003$
Language Training and Special Education	.00	$P < .50$ n.s.
Language Training and Special Education vs. Special Education Only	.51	$P < .30$ n.s.
Language Training Only vs. Neither Language Training Nor Special Education	1.75	$P < .04$
Language Training Only vs. Special Education Only	.51	$P < .30$ n.s.
Special Education Only vs. Neither Language Training Nor Special Education	.65	$P < .25$ n.s.
Total Language Training vs. Total Control	1.68	$P < .04$

*Significance levels computed for one-tailed tests.

Again, the Mann-Whitney U-Test was utilized to compute differences between the four groups. The greater gains in I.Q. scores evidenced by the Language Training and Special Education Group as compared to the Neither Language Training Nor Special Education Group is reflected in a highly significant P value of less than .0003. Statistically significant differences were also found between the Language Training Only Group vs. the group receiving neither Language Training Nor Special Education ($P < .04$). The remaining sub-group comparisons showed no significant differences in I.Q. score changes. Finally, the Total Language Training Group achieved significantly greater I.Q. score increases than did the Total Control Group ($P < .04$).

Final Results Comparing the Total Experimental and Control Groups at Nine and 18 Month Periods.

All the measurement instruments were again readministered at approximately 18 months. Those children who had attended language classes during this time interval were compared with those residents comprising the total control group. Attrition over the 18 month period included three subjects in the Total Control Group (leaving a final group of 37) and one child in the Total Experimental Group (leaving a final total of 39).

Within and between group comparisons were made on the ITPA and Stanford-Binet Test for the three testing periods. Within group gains over the three testing periods were evaluated with the Friedman Two-way Analysis of Variance Test (Siegel, 1956). Comparisons of test score gains between the Total Experimental and Total Control Groups for the ITPA and Binet test were made with the Mann-Whitney U-Test (Siegel, 1956) for the following time intervals: pre to 9 months, pre to 18 months, and 9 to 18 months. Within and between group comparisons on the Vineland Social Maturity Scale and Mecham Verbal Language Development Scale were made for the pre and 18 month testing periods, using the Friedman and Mann-Whitney statistical tests.

Statistical Evaluation on the ITPA. The mean raw scores on the ITPA for the Total Language Training and Total Control groups at the three testing periods are shown in Figure I.

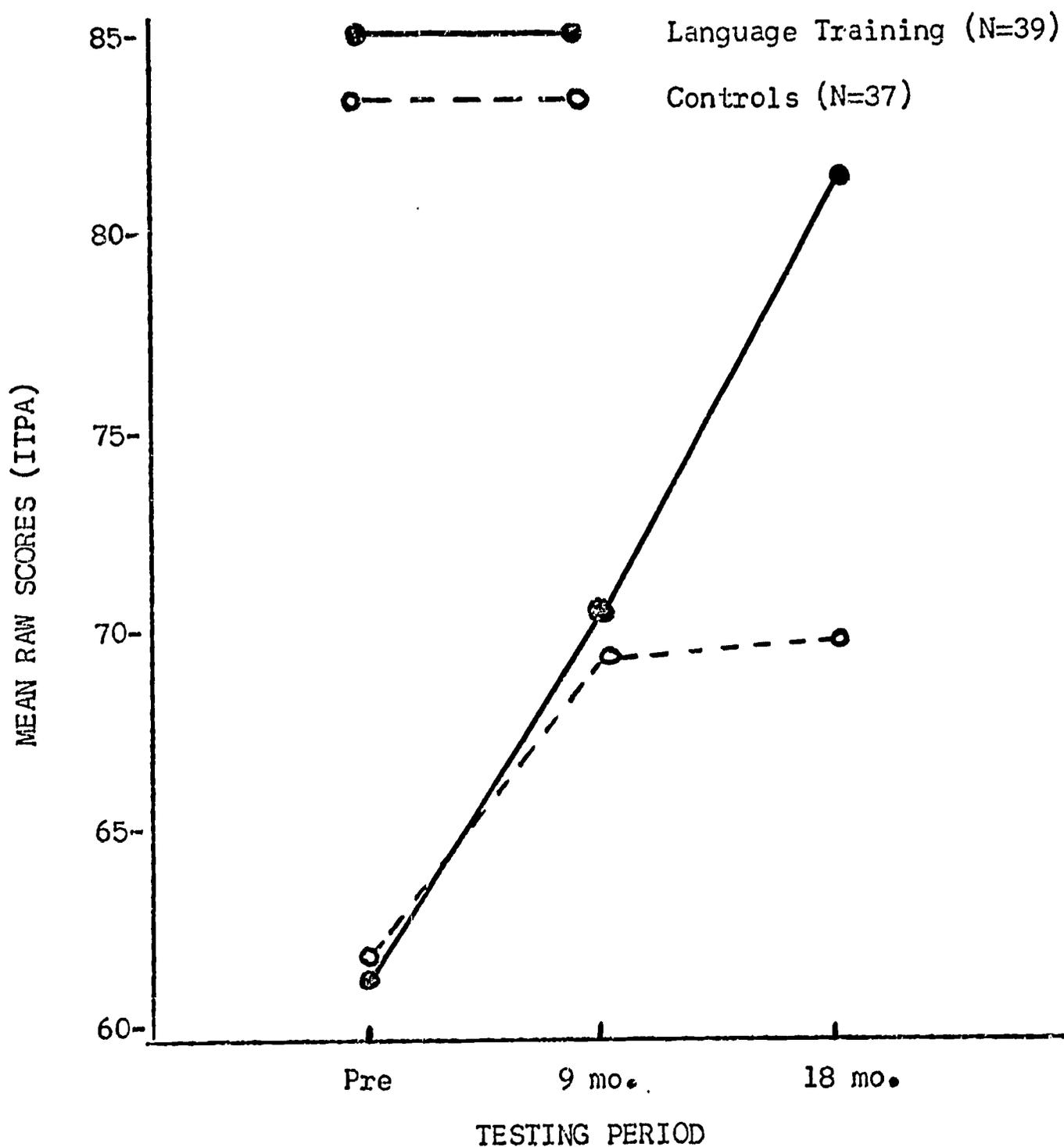


Fig. I. Mean raw scores on the ITPA for the Language Training and Control Groups prior to the start of the program and at 9 and 18 month time intervals.

As can be observed from Figure I, the Language Training Group increased from a mean raw score of 61.02 during the pre testing period to 70.41 at the 9 month interval and to 81.43 points at the final (18 month) testing period. The Total Control Group started with a mean raw score of 61.83. This group increased to 69.16 at the 9 month period and to 70.08 for the 18 month interval. The statistical analyses of ITPA raw score increases across the three testing periods for the Language Training and Control groups are presented in Table 7.

Table 7

Within Group Analysis of ITPA Score gains
for the Language and Control Groups using
the Friedman Two-way Analysis of Variance Test

Testing Interval	Mean Raw Score Gains	Xr ² *	d.f.	P-Value
	Language Training Group			
Pre - 9 mo. - 18 mo.	—————	32.75	2	<.001
Pre - 9 mo.	+9.39	9.31	1	<.01
9 mo. - 18 mo.	+11.02	22.57	1	<.001
Pre - 18 mo.	+20.41	25.84	1	<.001
	Control Group			
Pre - 9 mo. - 18 mo.	—————	15.35	2	<.001
Pre - 9 mo.	+7.33	11.57	1	<.001
9 mo. - 18 mo.	+.92	.99	1	<.50, n.s.
Pre - 18 mo.	+8.25	8.38	1	<.01

*P-Value of Xr² computed from X² table.

The Language Training Group showed significant gains at both 9 and 18 month intervals with a highly significant pre to post (18 month) increase of (P<.001). The Control Group gained significantly on the ITPA at the 9 month interval, but failed to show significant gains between 9 and 18 month. Overall gains for the Control Group (pre to 18 month) were significant at the .01 level.

A comparison was next made to determine if the Language Training Group gained more on the ITPA than did the Control Group at 9 and 18 month intervals. These comparisons are presented in Table 8.

Table 8

Comparison of ITPA Raw Score Changes
Between Experimental and Control Groups
at 9 and 18 Months

Time Interval	z-Value ¹	Level of Significance
Pre - 9 mo.	1.01	P < .15, n.s.
9 mo. - 18 mo.	4.05	P < .00003
Pre - 18 mo.	3.57	P < .0002

¹z-Value converted from Mann-Whitney U-Test

As can be observed in Table 8, highly significant differences were found, in favor of the Language Training Group, at 9-18 month and Pre-18 month intervals. Differences in ITPA gains were not indicated between the two groups during the first nine months of the program.

Statistical Evaluation on the Stanford-Binet Test. The mean I.Q. scores on the Stanford-Binet Test for the Language Training and Control groups at the three testing periods are shown in Figure II.

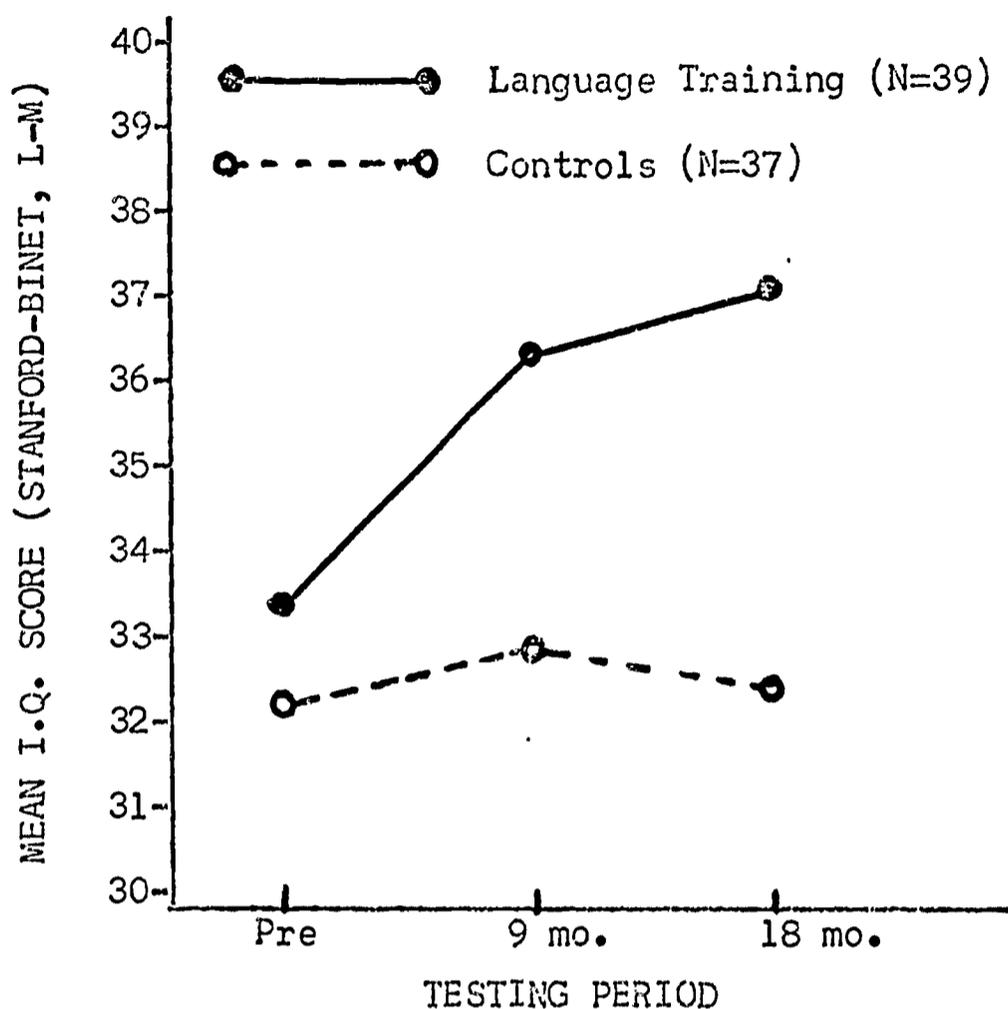


Fig. II. Mean I.Q. scores on the Stanford-Binet Test for the Language Training and Control groups prior to the start of the program and at 9 and 18 month time intervals.

Reference to Figure II shows the Pre-test mean I.Q. score for the Language Training Group to be 33.38. This group increased to a mean I.Q. score of 36.28 at 9 months and 37.02 at 18 months. The Control Group started with a mean I.Q. score of 32.10. This group showed a very slight increase to 32.86 points at the 9 month interval and a slight drop to 32.32 at the post testing period. Table 9 presents the statistical analyses of I.Q. score changes across the three testing periods for both the Language Training and Control Groups.

Table 9

Within Group Analysis of I.Q. Score Changes
for the Language and Control Groups
Using the Friedman Two-Way Analysis
of Variance Test

Testing Interval	Mean I.Q. Score Changes	X_r^2 *	d.f.	P-Value
	Language Training Group			
Pre - 9 mo. - 18 mo.	_____	7.39	2	< .05
Pre - 9 mo.	+2.90	6.35	1	< .02
9 mo. - 18 mo.	+ .74	1.29	1	< .30 n.s.
Pre - 18 mo.	+3.64	1.38	1	< .30 n.s.
	Control Group			
Pre - 9 mo. - 18 mo.	_____	.20	2	< .95 n.s.
Pre - 9 mo.	+ .76	—	—	—
9 mo. - 18 mo.	- .54	—	—	—
Pre - 18 mo.	+ .22	—	—	—

*P-Value of X_r^2 computed from X^2 table.

A significant difference in I.Q. scores across the three testing periods was found for the Language Training Group ($P < .05$). Further analyses indicated the major gains were made during the first 9 month interval. Tests of statistical significance were not found for the 9 to 18 month and Pre to 18 month intervals for this group. A statistical difference was not found between the three testing intervals for the Control Group. Separate statistical tests between the various time intervals were, therefore, not required.

Comparisons were next computed for the I.Q. score increases between the Language Training and Control groups at the 9 and 18 month time intervals. These results are presented in Table 10.

Table 10

Comparison of Stanford-Binet I.Q. Score Changes
Between Experimental and Control Groups
at 9 and 18 Months

Time Interval	z-Value*	Level of Significance
Pre - 9 mo.	1.77	$P < .03$
9 mo. - 18 mo.	.51	$P < .28, n.s.$
Pre - 18 mo.	1.43	$P < .07, n.s.$

*z-value converted from Mann-Whitney U-Test

Significant differences between groups, in favor of the Language Training Group, were indicated for the Pre-9 month period. The Pre-18 month test did not quite reach the required level of statistical confidence ($P < .07$).

Statistical Evaluation for the Vineland Social Maturity Scale.² The Language Training Group had a mean Social Quotient (SQ) on the VSMS of 54.05 for the pre-testing period. At the 18 month interval this group had a mean S.Q. of 57.02 with a mean gain of 2.97 points. This increase was not statistically significant ($Xr^2 = 1.16, P < .30, d.f., 1$).

The Control Group started with a mean S.Q. of 47.13 and showed a negligible gain to 47.21 at the 18 month period. This increase was not statistically significant ($Xr^2 = 1.85, P < .20, d.f. 1$)

A comparison of S.Q. increases between groups over the 18 month period was also non-significant ($z = .561, P < .28$).

²Both the Vineland Social Maturity Scale and Mecham Language Development Scale were adversely affected by a re-shuffle of residents in the hospital shortly prior to the administration of these instruments. As a result, many of the ward attendants were unfamiliar with the subjects they were evaluating. Consequently, results from both these instruments are considered unreliable and at best, only semi-valid.

Statistical Evaluation for the Mecham Language Development Scale. The mean Language Age (LA) for the Experimental Group increased from 4.08 to 4.85 during the 18 month period. This within-group increase was not statistically significant ($Xr^2 = 1.16$, $P < .30$, d.f., 1).

The Control Group advanced from a mean LA of 3.84 at the start of the program to 4.57 at the final testing period for a net LA gain of .73 points. This gain was statistically significant ($Xr^2 = 4.23$, $P < .05$, d.f., 1).

Language Age increases between the Experimental and Control Groups were non-significant, however ($z = .374$, $P < .35$).

Supplementary Evaluation of the High and Low Level Classes.

Supplementary analyses were made for the children attending the "High" or "Low" level classes. This was done in order to provide some sort of assessment of the language materials developed for the low level classes as contrasted to the PLDK kits used in the high level classes.

Mean raw scores on the ITPA for the 20 children attending the low level classes increased from 24.95 at the pre-evaluation testing period to 33.75 at the nine month interval and to 45.00 points at the post (18 month) period. The mean increase for the total length of the project was 20.05 raw points on the ITPA.

The 19 children attending the high level classes showed mean ITPA raw score increases from 99.00 to 109.0 to 119.78 at the pre, 9 month, and 18 month testing periods. This over-all gain was 20.78 points.

Stanford-Binet I.Q. points for the low level classes increased from an initial mean of 25.40 to 29.75 at the 9 month period to 33.15 at the post evaluation period, for an over-all increase of 7.75 I.Q. points.

The Friedman Two-Way Analysis of Variance indicated significant differences between the three testing periods ($Xr^2 = 16.10$, $P < .001$, d.f., 2). Further analyses showed significant gains between the Pre and 9 month ($Xr^2 = 8.50$, $P < .01$, d.f., 1) and Pre to 18 month ($Xr^2 = 9.80$, $P < .01$, d.f., 1) testing periods. Significant differences were not evident between the 9 and 18 month intervals ($Xr^2 = 1.80$, n.s., d.f., 1).

Children attending the high level classes had an initial mean I.Q. of 41.84 points. The 9 month testing period showed a mean of 43.10 I.Q. points and a mean of 41.10 was computed at the 18 month period for an over-all loss of .74 I.Q. points. There were no significant differences in I.Q. score changes between these three testing intervals ($Xr^2 = .82$, n.s., d.f., 2).

CHAPTER IV

DISCUSSION

Results from the first nine months of the program using the four experimental and control groups clearly show the benefits of both Language Training and Special Education when compared to those children who received neither of these educational experiences. The Language Training and Special Education Group gained significantly more on both the ITPA and Stanford-Binet Test than did the group of children receiving neither Language Training Nor Special Education. The second major finding during the first nine month evaluation period was the significantly greater gains on I.Q. scores made by the Language Training Only Group as contrasted to those subjects in the Neither Language Training Nor Special Education Group. This finding was further substantiated by the greater I.Q. gains made by the Total Language Training Group when compared to the Total Control Group. It should also be pointed out that significant differences were not found on the Stanford-Binet Test between those children attending Special Education Only versus those children attending neither Special Education nor Language Training classes.

This finding is similar to other studies (Cain and Levine, 1961; Hottel, 1958) which have failed to find significant improvement among trainable children attending Special Education when compared to matched children not attending such classes.

Over-all gains on the ITPA by those children attending Language Training classes were not statistically greater than those not attending Language classes during the first nine months of the program. The Language Training Only Group and the Special Education Only Group did not gain more on the ITPA than did those children who were not attending either one of these programs. This finding is difficult to explain since children in Language Training classes made significantly greater I.Q. score gains than did the Total Control Group over this same time period.

It was unfortunate that these four experimental and control groups could not have been maintained over the second nine month period of the program. The Special Education classes served as a powerful control group by which the effects of Language Training could be more accurately assessed. Yet, results from the first nine months of the program did not indicate that Special Education classes constituted an insurmountable variable in appraising the over-all effects of Language Training. The major confounding experimental variable which may have influenced the results was the additive factor of Language Training. In other words, children attending Language Training

classes were exposed to an extra educational experience which, regardless of its content, may have been responsible for any results. However, since one of the major goals of the present project was to show the expediency and economical advantages of using non-professional personnel as educational therapists, such a criticism is not necessarily of major importance. With the above considerations in mind, the discussion will now center around a comparison of the total experimental and control groups over the full 18 month period.

The Total Experimental Group was composed of those children who were in the Language Training Only and Language Training and Special Education groups during the first nine months of the program. The Total Control Group was comprised of those children who were originally in the Special Education Only and Neither Language Training nor Special Education groups.

Within group gains on the ITPA were significant for both the Language Training and Control Groups between the pre and 18 month testing period. The Control Group showed significant gains between the pre and 9 month testing periods but now between the 9 and 18 month intervals. This finding is difficult to interpret. Possibly the significant increase during the initial month was a natural variation of test scores which might have been spuriously high at the nine month interval (Refer to Figure I). In other words a more normal growth on the ITPA without direct intervention might have been reflected more accurately in a straighter line of growth between the pre and 18 month testing periods for the Control Group.

The sharp rise on the ITPA among children in the Language Training Group at the nine and 18 month testing periods strongly supports the basic hypothesis of the study. Greater over-all gains made by the Language Training Group which compared to the matched Control Group further substantiates the position that systematic and intense language training can improve performance in this area, at least as measured by the ITPA. It should be pointed out, however, that the over-all raw score gains made on the ITPA by the Language Training Group reflects only a seven month language age increase on this instrument. Nevertheless, this growth is considered fairly substantial in consideration of the relatively high chronological ages of subjects in the program and the low norm ceiling on the ITPA.

Results on I.Q. gains between the Language Training and Control Groups are less clearly pronounced. Reference to Figure II indicates fairly substantial mean differences between the two groups at the nine and 18 month intervals. However, a wide variability in I.Q. score increases produced a false impression for the Language Training Group in the over-all gain on the Stanford-Binet. Eight children in the Language Training Group evidenced I.Q. score increases of more than 10 points

over the 18 month period. Four of these eight subjects gained more than 15 I.Q. points over this same period with one child showing a increase of 25 I.Q. points. These large gains tended to raise the mean I.Q. increases for the Language Training Group somewhat out of proportion to the overall group gains which seem evident in Figure II. The Control Group, on the other hand, had only four children who made I.Q. score increases of ten or more points over the 18 month period.

The Language Training Group demonstrated significant I.Q. gains during the first nine month period but, over-all gains over the entire 18 months did not reach the required level of statistical significance. A comparison between the two groups (Total Language Training vs. Total Control) over the first nine month period indicated significantly greater gains made by children attending language classes. However pre to post (18 month) comparisons fell slightly short of statistical significance ($P < .07$).

In summary, evidence indicating that Language Training increases I.Q. scores is equivocal. Definitely, the trend is in favor of those attending language classes and continued participation over a longer span of time might strengthen the differences between groups. At least, as a group, those children attending Language Training were showing I.Q. improvement. The downward spiral in I.Q. scores evidenced by many institutionalized children had started to reverse itself as a function of language development classes.

A comparison of gains on the VSMS and Mecham Language Development Scales indicated no significant differences between groups over the 18 month period. The Control Group showed a significant test-retest gain on the Mecham even though, as a group, they gained slightly less than did the Language Training Group over the 18 month period. As stated previously, results on both of these instruments were confounded by a large scale hospital patient movement program just prior to the post evaluation period.

A computation of ITPA and Stanford-Binet scores for children attending either the high or low level classes in the Language Training Group revealed some interesting findings. Both the high and low level groups showed similar mean increases of 20 points on the ITPA. However, the children in the low level classes showed an over-all mean gain of 7.75 I.Q. points on the Stanford-Binet while the high level group remained about the same on this test. Several differences between the two groups may have accounted for the differential I.Q. score changes in favor of the low level classes. First, the low level group had an initial mean I.Q. score (25.40 points) which was significantly lower than children in the high level classes (mean I.Q. of 41.84). Thus, children in the low level classes had more

room for improvement. Second, the initial mean chronological age of children in the low group was 11.40 years as compared to 14.26 for the high level group. This age discrepancy may have made it more difficult for improvement on the Stanford-Binet among children in the high level classes because of the age norms on the test.

To further assess the chronological age variable, a Spearman Rank Order Correlation (Seigel, 1956) was computed between initial CA's and I.Q. score increase over the 18 month period for all 39 children in the Language Training Group. A correlation coefficient of only .18 was found indicating no significant relationship between chronological ages and I.Q. score increases for this group.

Perceived in its total perceptiveness, the results of the Language Training program are most encouraging. The type of low functioning, fairly old, and some cases, multiply-handicapped children included in the program have traditionally been considered a difficult group to effectively work with. Some of this difficulty was encountered when attempts were first made to provide workable language development materials for the low level classes. Considerable time was used during the first nine months trying out various materials and procedures. The series of lesson plans developed during the course of the project for use with the low functioning retarded child appear to have much merit. Yet, further explorations with these materials over a longer span of time is warranted. Further, there is the need to devise group lessons which are even more basic than those developed for the present project. These lessons were possibly still too difficult for a small proportion of children in the low level classes. These were primarily those children who had developed only the rudiments of productive speech skills and were unable to consistently respond to parts of the daily lessons requiring at least a minimal expressive vocabulary.

An experimental analysis of the token reinforcement system was not made during the course of the study. Implementation of the token system was based on the fairly well established premise that reinforcement procedures are a necessary and vital component of the learning acquisition for mentally retarded children. Observations of the classroom learning climate, as assessed by the language developmentalists and other project personnel would certainly support this premise. A sharp reduction in disruptive behaviors was noted. A small amount of data prior to and following the introduction of the token system was compiled by two classroom observers using a check list of several behaviors (talking out, out of seat, screaming, pinching, hitting, burping, and whistling). These observations were made for two classes. In Class I the median disruptive behavior dropped from 2.40 per minute to .34 per minute. In Class II,

the median dropped from .42 to .26 times per minute. A fuller and more extensive analysis of the effects of tokens on disruptive behaviors was not possible due to the lack of a sufficient number of observers. Yet, these tentative and at least partial results tended to confirm the observations of the two language developmentalists that the token system gave them sufficient classroom control to enable them to effectively teach the children.

Further, the use of tokens enabled the teachers to immediately reinforce any number of desirable responses to the lesson plans. It allowed them to differentially reinforce the children in accordance with their individual capabilities. Reports from the language developmentalists indicated that the children were more attentive and responsive to the materials when the token system was introduced. Again a more detailed analysis of this observation needs to be made.

Undoubtedly, one of the most significant and truly important findings from the research project pertained to the role of non-professional personnel as classroom teachers for mentally retarded children. The first 9 months of the study indicated that children attending language classes were progressing as well in language development and I.Q. score increases, if not better, than those attending regular Special Education classes in the institution. Over-all results of the project demonstrate that non-professional persons could function as classroom teachers in developing and enhancing the speech and language skills of low functioning mentally retarded children. There are several important implications from the results of the present study as they relate to the utilization of non-professional personnel as educational therapists in our institutional settings.

First, and most obvious, is the wealth of non-professional persons who could be utilized in the formal education of the institutionalized retarded child. Too frequently, there is a shortage of trained personnel to carry out broadly based educational and training programs. State institutions are faced with strong competition for trained professional persons from surrounding school systems needing Special Education services. Competition from salaries and the nine month working year make it difficult for institutions to employ and hold competent teachers and other adjunctive therapists. Programs utilizing non-professional personnel can operate with fewer professional staff members and are less disrupted by turnover problems. The turnover among language developmentalists did not affect the over-all continuity of the program since there was an abundant supply of non-professional persons in the institution ready to accept the job as a language developmentalist on very short notice. It was further discovered that training for new language developmentalists could be accomplished within a two week time period. On the other hand, turnover among teachers is

a more pervasive problem since recruitment of new teachers may take months, or even years. This seriously affects the continuity and intensity of the institution's education program.

Second, the utilization of non-professionals allows a wider coverage of the resident population. From the sheer point of finances it is easier to provide more educational programs to a larger number of patients when professional staff members direct and supervise non-professional persons who have proven themselves as competent and reliable employees. Similarly, this type of program helps bridge the gap between non-professional and professional staff members. It helps make the non-professional person a more integral part of the education and training programs by bringing them into direct and formal contact with that aspect of treatment which has traditionally been solely in the domain of the professionals.

Finally, utilization of non-professionals as teachers or therapists has many beneficial practical advantages, if recruitment takes place in the indigenous institution. Employment of former Psychiatric Aides, as done in the present project, seems especially advisable. These persons are accustomed to working with the type of child they may have in class. Typically, they have been trained to meet and handle any emergency situation which may arise, such as seizures. These persons usually know ward routines and the general operation of the hospital. They do not engender the mistrust or hostility of other personnel working on wards housing children attending their classes as is often the case for persons in a professional role. All of the four language developmentalists who have at some time participated in the project have been more than adequately competent. Each has had her own strengths and weaknesses in relation to her role. Yet, each one of these teachers has effectively and reliably taught those children assigned to her.

It should be stressed, however, in view of the above discussion concerning utilization of non-professional persons, that the success of this approach is largely dependent on the supervision and consultation provided to them. It is doubtful that non-professional persons have had the needed training to independently function as language developmentalists. They need to be provided with the right types of materials and trained to successfully use them. They need assistance in handling classroom behavior problems and they need a supervisor who is readily available to discuss any contingencies that may arise. Programs utilizing non-professional persons in an educational role should make special efforts to offer fairly intense and continued supervision to these individuals.

Problems and Deficiencies of the Project.

There occurred a surprisingly small number of real problems

during the course of the study. The loss of the Special Education control groups after a 9 month period presented the most severe problem in maintaining an adequate experimental design. The turnover among classroom teachers was, however, an unavoidable situation in which little, if anything, could be done by the Project personnel.

Finding appropriate classroom materials for the low level classes seriously delayed the implementation of an effective language development program for the initial three to four months of the project. Yet, this problem forced the development of a new lesson series for these children which will be beneficial to others attempting to work with the very low functioning retarded child.

The token reinforcement system created a few minor problems. The major difficulty in this area was the use of non-contingent food reinforcers in other settings within the institution which seemed to reduce the reinforcing value of chips for a few of the students. Persons lacking a real understanding of reinforcement theory indiscriminately used sweets when working with the children. They would almost continually feed a child to keep him "contented", or they would satiate the child with food at the end of an activity program in the hope that the child would be more willing to return the next time. Many of these incidents occurred under the guise of "operant conditioning." This problem was partially resolved by providing a large number of non-edible back-up reinforcers for exchange of the tokens.

The major deficiency in the program has been in the evaluation of progress. Standardized instruments currently available to us are really too gross to accurately reflect the more basic types of learning, growth, and development which are of significant importance to programs involving the training of low functioning retarded children. Numerous personnel within the institution have commented that children going to language classes were talking more and better. This of course was one of the primary objectives of the program. At the same time there was no easy way to assess this observation nor were there personnel available to make objective observations. Other important data needed to be collected in the areas of grammatical morphology and syntax, response length, and so on. Observations needed to be made on a continual basis, rather than at lengthy pre, mid, and post-testing periods.

Recommendations.

The following recommendations have emerged from the project and the results obtained therefrom:

(1.) Systematic and intense language training classes should become an integral and basic aspect of the treatment program in

institutions for mentally retarded children. Such classes should constitute a separate entity and not be subsumed under other treatment programs. Language training classes should be made available to a large number of residents with diverse language and speech abilities.

(2.) Non-professional personnel should be utilized as language developmentalists in the implementation of these programs. Efforts need to be made to create permanent positions for language developmentalists in our institutional settings. The feasibility of using non-professional persons in other educational and training areas, such as Physical Therapy, Occupational Therapy, Recreational Therapy and Special Education, should be explored.

(3.) Where possible, the non-professional persons employed as Language Developmentalists should be recruited from the same institutional setting where the program is to be initiated.

(4.) The role of the Clinical Speech Specialist in the institutional setting for the mentally retarded needs to be revised. These persons should primarily become consultants to large scale language development programs wherein they supervise non-professional persons in conducting language training classes. The Speech Specialist should be responsible for helping the non-professional persons select classroom materials, develop effective teaching techniques and handle classroom behavior problems.

(5.) Considerable care needs to be taken in selecting and using the classroom materials appropriate to the various levels of classes.

(6.) A token reinforcement system should become a viable and intrinsic part of the language development program to obtain optimal performance from the students.

(7.) Further research is needed pertaining to the effectiveness of these programs using more detailed, systematic, and valid measurement procedures and techniques. Generalization of speech and language behavior to non-classroom settings is an especially needed area of research.

REFERENCES

- Badt, Margit I. Levels of abstraction in vocabulary definitions of mentally retarded school children. Amer. J. ment. Defic., 1958, 63, 241-246.
- Batza, E. M. Investigation of speech and oral language behavior of educable mentally retarded children. Unpublished Dissertation, Northwestern University, 1956.
- Blessing, K. R. An investigation of psycholinguistic deficit in educable mentally retarded children: Detection, remediation, and related variables. Unpublished Doctoral Dissertation, University of Wisconsin, 1964.
- Blue, C. M. The effectiveness of a group language program with trainable mental retardates. Unpublished Manuscript. Appalachian State Teachers College, Boone, North Carolina, 1963.
- Cain, L. F., and Levine, S. A study of the effects of community and institutional school classes for trainable mentally retarded children. San Francisco: San Francisco State College, 1961.
- Doll, E. A. Vineland social maturity scale: Manual of directions. Minneapolis: American Guidance Service Inc., 1947.
- Dunn, L. M. and Mueller, M. The effectiveness of the Peabody Language Development Kit and the Initial Teaching Alphabet with grade one disadvantaged children: The PLDK and ITA in Nashville after one year. IMRID Monograph #2, Nashville: Peabody College, 1965.
- Dunn, L. M., Horton, Kathryn B., and Smith, J. O. Manual for the Peabody language development kit. (Level #P) Minneapolis: American Guidance Service, Inc., 1968.
- Dunn, L. M. and Smith, J. O. Manual for the Peabody language development kit. (Level #1) Minneapolis: American Guidance Service Inc., 1965.
- Dunn, L. M. and Smith, J. O. Manual for the Peabody language development kit. (Level #2) Minneapolis: American Guidance Service Inc., 1966.
- Dunn, L. M. and Smith, J. O. Manual for the Peabody language development kit. (Level #3) Minneapolis: American Guidance Service Inc., 1967.
- Ensminger, E. E. The effects of a classroom language development program on psycholinguistic abilities and intellectual functioning in slow learning and borderline retarded children. Unpublished doctoral dissertation, University of Kansas, 1966.
- Freeman, G. G. and Lukens, Jean. A speech and language program for educable mentally handicapped children. J. speech hear. Dis., 1962, 27, 235-236.

References (Continued)

- Peins, Maryann. Mental retardation: A selected bibliography on speech, hearing, and language problems. Asha, 1962, 4, 38-50.
- Plotkin, W. H. Situational speech therapy for retarded cerebral palsied children. J. speech hear Dis., 1959, 24, 16-20.
- Riello, A. Articulatory proficiency of the mentally retarded child: An investigation to determine the relationship between articulatory proficiency and the I.Q. of the educable public school children of retarded mental development. Unpublished Doctoral Dissertation, New York University, 1958.
- Rittmanic, P. A. An oral language program for institutionalized educable mentally retarded children. Amer. J. ment. Defic. 1958, 63, 403-407.
- Schiefelbusch, R. L., Copeland, R. H., and Smith, J. O. Language and mental retardation: Empirical and conceptual considerations. New York: Holt, Rinehard and Winston, Inc., 1967.
- Schlanger, B. B. Environmental influence on the verbal output of mentally retarded children. J. speech hear. Dis., 1958, 19, 339-343.
- Shubert, D. W. and Fulton, R. T. An inservice training program on communication. Mental Retardation, 1966, 4, 27-28.
- Siegel, S. Nonparametric statistics. New York: McGraw-Hill Book Co., Inc., 1956.
- Siegel, S. M. Discrimination among mental defective, normal, schizophrenic, and brain damaged subjects on the visual-verbal concept formation test. Amer. J. ment. Defic., 1957, 62, 338-343.
- Siegel, S. M. Verbal behavior of retarded children assembled with pre-instructed adults. Monograph Supplement, J. speech hear. Dis., 1963, 10, 47-53.
- Siegel, S. M. and Harkins, J. P. Verbal behavior of adults in two conditions with institutionalized retarded children. Monograph Supplement, J. speech hear. Dis., 1963, 10, 39-46.
- Sievers, Dorothy J. and Essa, Shirley H. Language development in institutionalized and community mentally retarded children. Amer. J. ment. Defic., 1961, 66, 413-420.
- Smith, J. O. Group language development for educable mental retardates. Except. Child., 1962, 29, 93-101.

References (Continued)

- Spradlin, J. E. Language and communication of mental defectives. Handbook of mental deficiency. N. R. Ellis (ed.) New York: McGraw-Hill Book Co., Inc., 1963, 512-555.
- Terman, L. M. and Merrill, M. L. Stanford-Binet Intelligence Scale (Form L-M). Boston, Houghton Mifflin Co., 1960.
- Travis, L. E. Handbook of speech pathology. New York: Appleton-Century-Crofts, Inc., 1957, 531-551.
- Van Riper, C. Speech correction: Principles and methods. New Jersey: Prentice-Hall, 1963, 92-126.
- Weld, R. G. An investigation of the long term effects of language training in the mentally retarded. Unpublished paper, Madison, Wisconsin: University of Wisconsin, 1964.

APPENDICES

APPENDIX A

ITPA raw scores for the Total Experimental
and Total Control Groups at the Pre, 9 month,
and Post (18 month) testing periods

Total Experimental Group
ITPA Raw Scores

Subject	Pre-Testing	9 Months	18 Months
1	46	87	111
2	11	7	9
3	31	38	55
4	35	41	51
5	13	4	15
6	139	105	133
7	7	20	25
8	29	26	24
9	34	33	37
10	7	11	15
11	127	116	130
12	108	132	130
13	148	155	159
14	99	104	111
15	19	55	70
16	18	21	30
17	8	35	22
18	30	43	55
19	19	24	38
20	79	90	95
21	71	87	98
22	41	34	70
23	118	105	126
24	123	130	144
25	21	33	45
26	40	43	52
27	35	39	42
28	126	137	155
29	13	31	61
30	66	87	100
31	149	168	174
32	120	127	134
33	37	54	59
34	79	106	116
35	18	33	33
36	96	119	137
37	46	66	82
38	59	58	91
39	115	142	142

Total Control Group
ITPA Raw Scores

Subject	Pre-testing	9 Months	18 Months
1	13	17	14
2	22	22	27
3	18	21	31
4	8	9	7
5	12	33	12
6	162	170	167
7	10	36	35
8	39	31	38
9	87	101	73
10	5	8	8
11	12	18	25
12	60	59	53
13	153	155	153
14	38	48	53
15	144	134	141
16	97	93	90
17	22	27	23
18	6	12	13
19	4	7	7
20	102	105	100
21	110	123	127
22	52	68	90
23	149	164	168
24	53	67	53
25	157	167	177
26	36	33	34
27	18	24	33
28	102	136	110
29	46	80	83
30	36	38	40
31	12	8	13
32	12	17	23
33	112	112	121
34	107	133	132
35	92	89	96
36	74	76	90
37	106	118	133

APPENDIX B

Stanford-Binet I.Q. scores for the Total
Experimental and Total Control Groups at the
Pre, 9 month and Post (18 month) testing periods

Total Experimental Group
Stanford-Binet I.Q. Scores

Subject	Pre-testing	9 Months	18 Months
1	21	39	31
2	15	13	11
3	32	34	32
4	23	24	19
5	12	3	11
6	37	33	31
7	26	23	26
8	14	14	18
9	25	36	38
10	28	31	30
11	37	40	35
12	32	40	33
13	37	37	36
14	38	40	38
15	53	59	55
16	24	25	36
17	14	18	33
18	22	30	39
19	38	40	40
20	30	31	26
21	21	31	30
22	32	35	35
23	54	51	52
24	58	57	54
25	17	36	42
26	19	20	38
27	30	37	39
28	38	39	42
29	25	31	39
30	44	48	47
31	58	59	56
32	53	48	49
33	54	51	48
34	45	45	41
35	33	40	38
36	44	49	45
37	37	45	44
38	27	31	32
39	55	52	55

Total Control Group
Stanford-Binet I.Q. Scores

Subject	Pre-testing	9 Months	18 Months
1	17	17	16
2	35	32	36
3	21	22	17
4	22	23	20
5	18	19	18
6	61	59	61
7	41	35	45
8	25	22	22
9	37	26	21
10	19	20	20
11	30	22	30
12	35	41	31
13	43	42	49
14	18	23	29
15	41	37	42
16	37	30	27
17	21	22	24
18	16	33	34
19	13	13	10
20	38	35	30
21	25	36	31
22	29	36	26
23	56	58	56
24	40	37	25
25	56	46	55
26	21	21	25
27	15	34	18
28	42	47	44
29	42	39	40
30	26	34	33
31	16	34	26
32	18	23	34
33	52	45	47
34	57	45	46
35	32	36	33
36	28	25	28
37	45	47	44

APPENDIX C

VSMS Social Quotients for the Total
Experimental and Total Control Groups at
the Pre, and Post (18 month) testing periods

Total Experimental Group
VSMS Social Quotients

Subject	Pre-testing	18 Months
1	39	50
2	21	28
3	48	49
4	29	30
5	35	40
6	69	46
7	41	58
8	27	28
9	50	60
10	62	43
11	43	46
12	42	39
13	63	83
14	43	66
15	70	111
16	53	63
17	56	52
18	46	44
19	74	79
20	34	40
21	40	43
22	66	64
23	83	76
24	65	71
25	77	66
26	42	49
27	73	61
28	50	88
29	48	68
30	69	58
31	55	70
32	12	13
33	84	87
34	73	61
35	33	38
36	44	45
37	74	58
38	39	45
39	92	66

Total Control Group
VSMS Social Quotients

Subject	Pre-testing	18 Months
1	25	60
2	61	66
3	51	23
4	51	45
5	51	42
6	62	65
7	62	83
8	37	39
9	14	32
10	43	21
11	48	52
12	41	46
13	47	53
14	35	40
15	17	28
16	36	43
17	38	38
18	40	56
19	21	20
20	38	28
21	41	38
22	33	40
23	70	87
24	64	38
25	73	76
26	24	12
27	49	51
28	46	39
29	64	64
30	47	63
31	61	57
32	51	54
33	61	63
34	98	60
35	24	26
36	28	36
37	92	63

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APPENDIX D

Mecham Verbal Language Development Scale
Language Ages for the Total Experimental and
Total Control Groups at the Pre and Post (18 month)
testing periods

Total Experimental Group
MLDS Language Ages

Subject	Pre-Testing	18 Months
1	2.06	4.33
2	2.55	1.89
3	3.60	4.00
4	2.89	2.89
5	2.11	2.89
6	3.00	5.25
7	2.78	2.55
8	1.83	1.44
9	3.80	5.00
10	2.60	2.11
11	4.33	5.25
12	3.00	5.25
13	7.50	6.12
14	3.60	5.00
15	3.60	5.25
16	2.55	3.20
17	3.20	5.50
18	2.94	3.80
19	2.94	3.80
19	2.94	4.33
20	4.33	5.75
21	4.33	5.50
22	4.67	4.83
23	8.00	6.62
24	5.87	7.50
25	4.67	3.60
26	1.55	3.80
27	4.83	4.67
28	5.00	7.50
29	2.44	4.33
30	5.75	4.00
31	8.00	11.00
32	5.00	5.25
33	5.50	5.25
34	5.25	6.00
35	2.67	3.60
36	5.00	5.00
37	5.75	5.25
38	3.30	5.50
39	6.75	6.50

Total Control Group
MLDS Language Ages

Subject	Pre-testing	18 Months
1	2.44	2.69
2	2.20	1.78
3	2.22	2.11
4	1.67	1.89
5	2.78	3.00
6	5.50	6.75
7	3.60	4.67
8	1.67	1.67
9	1.33	2.33
10	2.40	1.22
11	1.55	2.89
12	6.00	6.75
13	6.00	6.75
14	2.55	2.33
15	6.00	6.50
16	3.20	5.75
17	2.67	1.78
18	1.55	4.00
19	2.78	2.00
20	2.55	5.75
21	5.75	6.25
22	5.00	4.33
23	8.50	12.00
24	1.94	2.67
25	10.00	11.00
26	2.78	2.44
27	2.00	3.20
28	6.25	4.67
29	5.25	6.25
30	2.67	4.00
31	2.22	2.89
32	1.44	2.78
33	6.50	6.50
34	6.75	7.50
35	4.33	6.50
36	2.00	5.50
37	8.00	8.00