THE LONG-TERM EFFECTS OF EARLY CHILDHOOD INTERVENTION

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Chapter 1

Introduction

Intervention strategies for young handicapped children are concerned with the remediation of disabilities early in each child's life in order to increase the child's opportunities to develop cognitive, social, and emotional abilities which will lead to a more productive and satisfying life (Hammer, n.d.). In a study concerning the stability of human characteristics, Bloom (1964) identified those periods in life when certain characteristics were stable and when they were subject to rapid changes. Bloom (1964) stated that "with the exception of school achievement, the most rapid period for the development of characteristics is in the first five years of life" (p. 204). Providing remediation at this early age does not imply that the disability will be removed or that the disability will not effect development; however, it does imply that the effects of the handicapping condition may be minimized in the formative years (Hammer, n.d.).

Early home intervention is recognized as a productive strategy for providing remediation for the young handicapped child (Gordon, 1970; Levenstein, 1971; Weikart, 1969; Kirk, 1969). To determine the significant effects of the inter-

vention, longitudinal data provide the most valid and direct ways of assessing the cognitive, social, and emotional outcomes of the programs for young handicapped children. The Program for Early Education of Children with Handicaps (PEECH), was one such program designed to train parents to function as paraprofessional educators under the supervision of home teachers until the child was able to enter school. This study analyzes the effects of the Program for Early Education of Children with Handicaps (Project PEECH) over a five year period.

Problem of the Study

There have been many home intervention programs established. Data are available on short term interventions; however, there is a lack of longitudinal data on the effects of home intervention programs. This study analyzes data collected over a five year period on children who participated in the Program for Early Education of Children with Handicaps to determine if gains were maintained over one, two, and three year periods.

Background and Significance of the Study

The Program for Early Education of Children with Handicaps (Project PEECH) was funded by the Bureau of Education for the Handicapped, Handicapped Children's Early Education Program in 1972. The purpose of the project was to establish an exemplary pre-school program for rural, handicapped

children through a home training approach. The rural, sparsely populated area served by the Region IX Education Service Center which includes twelve north central Texas counties, and covers 10,230 square miles with a total population of 210,896 (1970 census) provided the setting for the early childhood education program. There were approximately 39,000 students in average daily attendance for the forty school districts in the area. The enrollment of the forty public schools ranges from an average daily attendance of eighty-five to 15,000 students. The population density which was computed from the average daily attendance of the project area revealed a mean of 3.8 children per square mile.

The original 1972 grant application stated that the program would include intensive planning which would provide for: (1) identification and diagnosis within a professional setting and (2) educational services for preschool handicapped children within the home until the child was able to enter school. Parents of the handicapped children were to be trained to function as "parent-paraprofessionals", thus the program was established as a service oriented program. The rationale of the program was based on research which indicates that the major influence of a child's pattern of achievement and learning is in the home (Gordon and Breivogel, 1976).

Attention to the importance of the home was recognized as early as 1654 by Comenius who noted the need for early childhood education and stated its significance. In his "school of the mothers", the mother started the child on the road to knowledge in early infancy (Comenius, translated by Eller, 1956). Other child advocates and philosophers such as Rousseau (1712-1778), Pestalozzi (1746-1827), and Froebel (1782-1852) stressed the importance of early home training for the child (Evans, 1975).

The organization of a child's development includes continuity, progression, and the opportunity for a child to live to the fullest capacity mentally, physically, emotionally, and socially. The child is a whole being whose needs cannot be met compartmentally. Environmental interaction should stimulate a desire to learn. A child's expected achievements should be based on a level of growth and style of learning (Hymes, 1968).

Gallagher (1968) spoke before a select subcommittee on Education and Labor in the United States House of Representatives concerning the national need for preschool and early education programs for handicapped children. He stated that "the earlier the child is educated, the greater the return for energy spent" (p. 1). According to Gallagher this is particularly true of the handicapped child whose problems in early development compound themselves if left unattended.

Therefore, educational programming for handicapped children must no longer be delayed until an optimum age is reached. Research, development, demonstration, training, and implementation were cited as essential components for a total program.

Several programs which emphasized utilizing parents as "educators" for young children were cited in the development of the PEECH project. The principal ones were Dr. Ira Gordon's Parent Education Program which provided home-visitors and parent-focused intervention through a Piagetian based curriculum; Dr. Susan Gray's Family-Oriented Home Visitor Program which focused on enabling the parents to become more effective educational change agents; Dr. Phyllis Levenstein's Mother-Child Home Program which utilized commercial toys to improve verbal interaction between mothers and infants under the supervision of "Toy Demonstrators"; and Dr. David Weikart's Carnegie Infant Program which was a home based program for very young infants and their parents (Lazar, Hubbell, Murray, Rosche, and Royce, 1977).

The PEECH program was based on the premise that parents can be effectively involved in the teaching of their own handicapped child on a daily basis and that changes in behavior can be observed and recorded by the parents. The ultimate goal of Project PEECH was that parents assume the

chief teaching responsibilities until the child was able to attend school.

The subject selection for program participation was determined by the following criteria: 1. referral; 2. age; 3. parental cooperation; 4. rural-urban status; 5. determination of student eligibility; and 6. availability of other programs. The six criteria for program participation are identified by the following explanations.

1. Referral. Initial identification of prospective subjects resulted from parental referral. Parents were informed of the availability of the program by releases through media, schools, and regional health services, and by subsequent cooperation of those agencies. On the basis of a formal request by a parent (or principal caretaker), an initial interview was arranged with the project director.

2. Age. Age range for admittance to the program was five months to six years.

3. Parental Cooperation. During the initial interview, the project director explained the program to the parent(s), described in detail the nature and magnitude of parental responsibilities, and established the willingness of the parent to cooperate. If the parents were unwilling to participate, the selection process was terminated.

4. Rural-urban status. The project was written for the rural area only. No services were provided to children

living in an urban area exceeding a population of 50,000.

5. Determination of student eligibility. The PEECH staff and designated Region IX staff were trained to conduct parental interviews and to make observations of the children in the home environment. This information served as a basis for staffing which included the project director, home teachers, Region IX personnel (educational diagnostician, speech therapist, physical therapist, and special education consultants), and parent(s) to determine the appropriateness of PEECH placement. Decisions for participation were made on the basis of type and degree of handicap.

6. Availability of other programs. If the child was eligible for programs other than PEECH due to age, location of the home, nature of the handicap, or for other reasons, the child was referred to the appropriate program. This policy within Project PEECH insured appropriate services for these children.

Children who satisfied these six criteria were admitted to the program. Ninety percent of the children who were originally referred were accepted into the program.

Professional and paraprofessional teachers were trained to function as home teachers. As home teachers they developed the individualized educational programs for each child from the information compiled through the results of the assessment instruments (Alpern-Boll Developmental Profile,

Cattell Infant Intelligence Scale/or Stanford-Binet Intelligence Scale), the data charted from the Portage Guide to Early Education (a developmental checklist listing behavioral activities in the areas of social, self-help, physical, communication, and academic skills) (Shearer, Billingsley, Frohman, Hilliard, Johnson, and Shearer, 1972), and parental interviews. This data provided the home teachers with the information necessary for making long and short term educational goals. These goals identified the desirable target behaviors to be achieved. The teacher commenced with a single behavior with which the parent and child could experience success. Developmental curriculum activities were then selected. Formal and informal observations of each child's performance allowed the teacher the opportunity to revise the planned program.

During each weekly session the teacher demonstrated the techniques to be utilized with the child while the mother observed. The mother, therefore, acquired knowledge of the processes of behavior modification, when to reward, what to reward, and how to chart each behavior. Through this modeling process the parent was able to continue the work for that week, thus achieving the short term goals. Individual folders were maintained for each child and changes in behavior were charted. This record keeping enabled the teacher to plan and re-assess each child's progress.

The curriculum was based on Logan's theoretical model which defines learning as a relatively continuous process resulting from generalized and consistent patterns (Logan, 1960). Activities related to the Portage Guide to Early Education (a developmental checklist) were based on the developmental skill areas; self-help, social, physical, communication, and academic. These activities were clearly outlined by the home teacher, thus defining the objectives which would be used to move each child forward in a carefully guided programmed sequence of educational activities.

The Memphis State Computerized Evaluation Program (Wong and Irwin, 1974) was used at each pre-post evaluation stage. This analysis included: (1) multivariate analysis of variance; (2) univariate analyses for each test; (3) one-way analyses of variance done in conjunction with the Newman-Keuls; and (4) confidence intervals for the probabilities of success with each test.

In an analysis of 98 program participants, both actual post- values and compensated post- values (Irwin and Wong, 1974) were used. The "compensated technique" is used with instruments that are scored in ages. In this technique, the assumption is made that the rate of development manifested by each child in each domain will remain constant during the intervention period. The compensated post-value, then, is the difference between the projected post- value and the

actual post- value. The compensated post- value is, in short, a mathematical correction for maturation. This design takes into account:

> (1) the differences in the chronological ages of the children; (2) the differences in the developmental ages of the children; and (3) the fact that not only did time elapse between the testings, but that the elapsed time varied with the children (p. 37).

An alternative procedure assumes that in respect to the normal child, "the development of a child who is below normal expectations, in the absence of intervention, continue to decline" (p. 37). Because the Irwin and Wong technique introduces a mathematically projected maturation effect, the intervention effect is systematically reduced with respect to the unmanipulated difference score. Thus tests of statistical significance are more stringent for compensated post-values than for unmanipulated change scores, particularly if the intervention time is great.

In a comparison of the entrance-exit data for the 98 children served by PEECH, the mean entrance CA was 43.8 months, with maximal and minimal ages of 79.7 and 5.3 months. The mean exit age was 54.8 months, with maximal and minimal ages of 87.9 and 22.4 months. The mean elapsed time was 10.9 months, with a range from 30.5 to 5.2 months. A conclusion of the comparison study of the entrance-exit data of the original 98 participants using the raw and "compensated"

(Irwin and Wong, 1975) data is made in the following paragraphs.

1. The Multivariate Analysis of Variance (MANOVA). The purpose of the MANOVA was to estimate the significance of the overall impact of the total program as represented by the entrance - exit data from each of the 98 children on each of the six tests entered in the analysis. The MANOVA for Entrance - Exit is significant, F (6, 92) = 13.58, $p < .001$. For each test, the change in mean compensated difference was positive. This analysis, then, strongly suggested that the total PEECH program was effective statistically.

2. Individual F-Ratios. In Appendix B, Table A summarizes the data for each administration of the six tests. The F-Ratio for the entrance - exit was significant in each instance, $p < .001$. This table also presents the mean, standard deviation, standard error of the mean, minimum, maximum, and range for each administration of each test. These data suggest that the improvement was general across each of the areas tested. Moreover, the magniture of the gains--expressed in months either as raw gain (post minus pre) or intervention effect (compensated post minus pre)--may reasonably be presumed to make an educational difference.

3. ANOVA and Newman-Kuels (Irwin and Wong, 1974). In the one way analysis of variance (block design) for each of

the six tests, the data were first standardized (subtract pre- mean and divide by pre- standard deviation) in order to minimize the effects of the different tests themselves. The purpose of the ANOVA was to test the hypothesis that the six tests do not differ in sensitivity, that is, in magnitude of change as measured. The between tests F-Ratio was significant, F (5, 97) = 3.51, $p < .004$. The Newman-Kuels is designed to test the statistical significance of the differences in the individual pairs of tests. The six tests, ranked in order of increasing magnitude of compensated change, are Alpern-Boll Social, Alpern-Boll Self-Help, Alpern-Boll Physical, Alpern-Boll Communication, Stanford-Binet/Cattell Intelligence, and Alpern-Boll Academic. Of the 15 possible intertest comparisons, only four comparisons (Alpern-Boll Academic and Stanford-Binet/Cattell Intelligence each against Alpern-Boll Self-Help and Alpern-Boll Physical) are significant, $p < .05$.

4. Summary of the analysis of the 98 original participants. The magnitude of the gains particularly when expressed in compensated values, the consistency of the tests of significance, the methods of subject selection and data collection, and the logical relationship between the nature of the program and the areas of progress, all make tenable the assumption that the PEECH program did make a significant educational impact on children.

Purpose of the Study

The home intervention strategy utilizes a teacher training the mother or principal caretaker to work with her handicapped child, thus enabling the parent to function as the principal program implementor. Since the PEECH project was initiated as a service oriented program and not a research program, the focus was on implementation of educational services. Although the project provided for the collection of data on individual children for program purposes, no provision was made for analyzing data to determine what, if any, long term effects could be assessed. It is assumed that the results of the analysis of data will provide insight into the capabilities of parents functioning as paraprofessional educators.

The specific purpose of this study was to determine the long-term effects of the early intervention program (PEECH) with respect to the following: (1) the gains made during intervention versus the gains made following intervention in relation to self-help skills, social skills, physical skills, communication skills, academic skills, and mental age; and (2) the relationship of the category of handicapping condition to the subsequent educational placement.

Definitions of Terms

For purposes of clarity the pre-test upon entrance to the program are referred to as program entry scores. The

second year post-test data are referred to as program exit scores. Scores from the second year of follow-up will be referred to as follow-up scores. Therefore, the study compared the differences between the entry and exit scores on the five measures of the Alpern-Boll Developmental Profile and the Stanford-Binet/Cattell Infant Intelligence Test with the differences between the exit and follow-up scores on the same measures to determine the rate of gains maintained following intervention.

Hypotheses

The following null hypotheses were tested:

$H_o^{(1)}$: There will be no significant difference for group 1 (N = 14) between the mean gain scores made during one year of intervention and the mean gain scores measured two years following intervention in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(2)}$: There will be no significant difference for group 2 (N = 18) between the mean gain scores made during two years of intervention and the mean gain scores measured two years following intervention in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(3)}$: There will be no significant difference between the mean gain scores of group 1 (N = 14) made during one

year of intervention and group 2 (N = 18) with two years of intervention as measured in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(4)}$: There will be no significant difference in the mean gain scores made two years subsequent to intervention by the two year intervention group (N = 18) as compared to the mean gain scores made by the one year intervention group (N = 14) as measured in the areas of self-help skills, socialization skills, communication skills, academic skills, and intelligence, and mental age.

$H_o^{(5)}$: There will be no meaningful difference in the category of handicap upon entrance in the program and in the subsequent educational placement.

Chapter 2

Related Literature

The purpose of this chapter is to present a review of literature directly related to the problem: (a) literature relating to longitudinal studies of programs for preschool handicapped children, and (b) literature relating to programs for preschool handicapped children.

Longitudinal Studies of Programs for Preschool Handicapped Children

Programs for the education of young handicapped children are supported in the literature in early childhood education, child psychology, learning theory, pediatric medicine, and other professional disciplines which study the development of systems of behavior in children. As early as 1939 Skeels and Dye studied the effects of a stimulating environment on development. This study involved 25 infants in which Skeels and Dye (1939) compared 12 infants placed on a ward in an orphanage to 13 infants who were placed with older girls who acted as mother surrogates in a cottage setting. The experimental group which was placed with mother surrogates had an average IQ of 64 with IQ scores ranging from 35 to 89 as measured by the Kuhlman Test of Mental Development. The control group left in the ward setting had an average IQ of

87 with an IQ range of 50 to 103. During a period of 19 months, the experimental group placed in the cottages received stimulation to talk, walk, and perform for their mother surrogates. Following this intervention period, these children demonstrated a mean IQ gain of 27.5 IQ points. In contrast, the control group which remained in the orphanage ward with little personal contact indicated a mean loss of 26.2 IQ points. This short term study is indicative of the effects of a stimulating environment on intellectual development (Skeels, Updegraff, Wellman, and Williams, 1938; Skeels and Dye, 1939).

Two additional follow-up studies on the 25 infants are reported by Skeels. In the first follow-up study made three years later Skeels (1942) reported that after three years the experimental children had retained their accelerated rate of development in foster homes, while the control group which remained in the orphanage retained their decreased intellectual performance. The second follow-up study examined how the two groups functioned in adult life. Skeels (1966) reported that the 13 subjects from the original experimental group were self-supporting and were not wards of the state in adult life. Of the 13 subjects, 11 had finished high school and four had completed one or more years of college work; 11 had married; and nine of these 11 married subjects had a total of 28 children with an average of three children

per family. The children's intelligence quotients ranged from 86 to 125, well within the range of the majority of the population. None of the children indicated mental retardation or demonstrated abnormal behavior.

In the group which remained on the ward of the orphanage, the average length of institutionalization was 22 years and 9 months as compared to an average length of institutionalization of five years and one month for the experimental group. Of the control group, seven were employed outside the institution, while four were employed as ward attendants in the institution. One of the subjects in this group completed an education beyond the eighth grade; two were married, with one subject being divorced. Both married subjects had children. The one who divorced remained on the ward and had a child with possible brain damage, while the remaining married subject had children who were within the range of normal development physically, emotionally, and mentally.

Hammer (n.d.), in a review of studies conducted on environmental effects on development reported that stimulation from an enriched environment can have positive long term effects. In this review Hammer (n.d.) states that:

> the handicapping condition of mental retardation due to the lack of stimulation seems to have been removed, a situation which is not always possible in dealing with the handicapped child whose problems may not be due to lack of stimulation but rather physical and sensory losses (p. 4).

Kirk (1958; 1965) studied the effects of preschool education for mentally retarded children. The children selected had revealed a range of intelligence scores from 40 to 80 as measured on the Stanford-Binet Intelligence Test scale and the Kuhlmann Test of Mental Development. The four groups of children were followed from three to six years of age in (1) a community setting and (2) in an institutional setting.

In the community setting, 28 children received daily a six hour enriched nursery school program until the age of school placement in contrast to the control group of 26 children who were not in a nursery school program. The institutionalized experimental groups consisted of 15 children who were offered a preschool program for six hours a day and a control group of 12 children who were not exposed to the enriched preschool program. Three years later, at the ages of seven and eight years, the experimental subjects in each group demonstrated a substantial gain in intelligence as measured by the Stanford-Binet and the Kuhlmann while the control group showed a decrease on the follow-up tests. Of the 15 children in the institutional experimental group, six were paroled from the institution, either to their own home or to foster homes, because of increases in intelligence quotients and adjustment. None of the control group were paroled from the institution during this period (Kirk and Gallagher, 1979, p. 124).

Kirk's study concluded that

> when intervention is not introduced at the pre-school level, children from inadequate homes tend to retain their rate of development or drop in rate of development as they grow older (Kirk and Gallagher, 1979, p. 125).

This study not only reinforces Skeels' findings that a stimulating intervention produces short term gains, but also implies that the time factor indicates long term gains are more probable if the intervention is conducted earlier in life. In this study Kirk (1977) concluded

> that intervention at the preschool level accelerates the rate of mental and social development, while no intervention at that age level tends to allow the rate of mental and social development to slow (p. 7).

Studies of twins and a variety of experimental work by Hunt (1961) indicated that intelligence can no longer be assumed to be fixed and predetermined by the genes. Through his continued studies he stated that it appears that for perceptual, cognitive, and intellectual functions early experiences may be more important than for the emotional functions (Hunt, 1964). In another study of the stability of human characteristics, Bloom (1964) supported the findings of Skeels and Kirk. He concluded that during the first three to four years approximately 50% of the development of intelligence that is to ever occur in the life cycle takes place. Bloom states:

> The effects of the environments, especially of the extreme environments, appear to be greatest in the

> early (and more rapid) periods of intelligence development. Although there is relatively little evidence of the effects of changing the environment on the changes in intelligence, the evidence so far available suggests that marked changes in the environment in the early years can produce greater changes in intelligence than will equally marked changes in the environment at later periods of development (p. 88-89).

The Milwaukee Project attempted to answer the question of deprivation and its destructive impact early in life. Heber (1971) initiated a study on a sample of 40 black mothers and their newborn babies living in the economically depressed area of Milwaukee. The mothers had intelligence quotients of 75 or less. These mothers and their babies were randomly assigned to an experimental group or a control group. The experimental group received two phases of intervention. First, the children were assigned to a highly trained teacher who provided total care for the children as well as organizing the child's learning environment to implement the educational program. The teacher worked with the child in the home for a period of two to eight weeks until the mother felt secure about the program and would enter the child in the center. As time went on the program took on more of the features of a preschool. The second phase of the program involved on-the-job training of the mothers and training of the mothers in homemaking and child-rearing skills.

In a summary of the status and degree of success of the two training programs, Heber related that the occupational

rehabilitation component appeared to be successful. Homemaking skills and care and treatment of children continue to be "resolved in the experimental families." The program emphasis is changing to "the general care of family and home, budgeting, nutrition and food preparation, family hygiene, and the mother's role in child growth and development" (p. 71-72).

The teaching was conducted in this program by paraprofessionals. The intervention programs were discontinued upon school entry. The mean IQ for the experimental group was 124 as compared with the control group mean of 94. The group was followed for four years (Heber, 1972). At age 10 the IQ for the experimental group was still over 100 while the control group IQ was 20 points lower. The experimental and control groups were also evaluated by other measures and the experimental children were superior to the control children on other behavioral measures. Heber concludes:

> Data to this point in time do nothing to inhibit the hope that it may indeed prove possible to prevent the high frequency of mental retardation among children reared by parents of limited intellectual competence under circumstances of severe economic deprivation (p. 11).

Guskin and Spicker (1968) conducted a study on a group of 28 five-year-old children from a culturally disadvantaged area. The intelligence quotients of the children ranged from 50 to 85. The researchers found that traditional kindergarten and first grade has some effect on intelligence,

but the experimental group which received a specialized curriculum made greater gains in intelligence scores.

Increased funding and support for programs for very young children and young handicapped children occurred in the sixties and early seventies. With the influx of funding evaluation of the effectiveness of the programs was mandated by the funding agencies. The first major study was conducted by Bissell (1970), and better known as the Westinghouse Report, analyzed the effectiveness of Head Start. The report pointed to the "wash-out" effect of gains made during summer Head Start programs, yet stated that the full-year programs that served the disadvantaged and handicapped could be effective in assisting these children maintain higher levels of achievement.

Bronfenbrenner (1975) conducted an evaluation summary of data on seven early childhood programs. The programs reported were: The Howard University Preschool Program in Washington, D.C. (Herzog, Newcomb, and Cisin, 1972a, 1972b; Kraft, Fuschillo, and Herzog, 1968); the Perry Preschool Project, Ypsilanti, Michigan (Weikart et al, 1970; Weikart, 1968); the Early Training Project, Nashville, Tennessee (Gray and Klaus, 1970; Klaus and Gray, 1968); the Philadelphia Project, Temple University; the Indiana Project, Indiana University (Hodges, McCandless and Spicker, 1967); the Infant Education Research Project, Washington, D.C. (Schaefer, 1968;

Schaefer and Aaronson, 1972); and the Verbal Interaction Project, Mineola, New York (Levenstein 1972, 1970). The two general trends found in Bronfenbrenner's study of these programs was, first, that preschool intervention is effective in producing substantial gains in intelligence during program intervention. The second trend noted was that, in general, one year after intervention is terminated, the IQ of the "graduates" begins to decrease (p. 537).

Lazar, Hubbell, Murray, Rosche, and Royce (1977) conducted an analyses of 14 longitudinal studies. These studies were of low-income children who participated in experimental infant and preschool programs prior to 1969. The programs included in this study were: the Philadelphia Project, Philadelphia (Beller); the Institute for Developmental Studies, Harlem (Martin and Deutsch); the Parent Education Program, Northern Florida (Gordon); the Early Training Project, Columbia, Tennessee (Gray); the Family-Oriented Home Visitor Program, Nashville, Tennessee (Gray); the Curriculum Comparison Study, Champaign-Urbana, Illinois (Karnes); the Mother-Child Home Program, Long Island (Levenstein); the Experimental Variation of Head Start Curricula, Louisville, Kentucky (Miller); the Harlem Training Project, Harlem (Palmer); the Perry Preschool Project, Ypsilanti, Michigan (Weikart); the Curriculum Demonstration Project, Ypsilanti (Weikart); the Carnegie Infant Program, Ypsilanti

(Weikart); the Micro-Social Learning System, Vineland, New Jersey (Woolman); and the Head Start and Follow Through New Haven Study, New Haven, Connecticut (Zigler). The results indicated that gains made by handicapped children in preschool programs are long lasting, that fewer children who had preschool experiences were placed in special classes or returned to special classes, and that fewer experimental children had to repeat grades.

Hayden, Morris, and Bailey (1977) made a follow-up study of graduates of the Model Preschool Center for Handicapped Children at the University of Washington. They found that children who had received early intervention were placed in special education programs less often than children who did not receive early training. In this report it was also discovered that the Model Preschool "graduates" maintained the cognitive development gains they made during preschool. Further analyzation of the data revealed that the graduates placed in special education scored as high as the scores of children in regular education on intelligence tests. They also reported that children placed in regular classes did not repeat grades, but kept up with their normal classmates.

In a study conducted for the Secretary of Health, Education and Welfare, Elliott Richardson, in 1972 by Donald Stedman, Ira Gordon, Ron Parker, Paul Dokecki, and Nicholas

Anastasiow special focus was placed on projects addressing high risk, preschool-aged children. In a summary of this study, Stedman (1977) stated that the final analysis demonstrated that early intervention had made positive effects. Program effectiveness relates to the variables which involve the children, the characteristics of the intervention program, and the people who deliver the services. Long term, or longitudinal studies on the development of young children are expensive. However, regardless of expenditures, a longitudinal approach is the best method for studying the environmental effects of intervention strategies.

Programs for Preschool Handicapped Children

Rationale for Program Development

Kirk and Gallagher (1979) define the term "exceptional child" in relation to the handicapped child as:

> the child who deviates from the average or normal child (1) in mental characteristics, (2) in sensory abilities, (3) in neuromotor or physical characteristics, (4) in social behavior, (5) in communication abilities, or (6) in multiple handicaps. Such deviation must be of such an extent that the child requires a modification of school practices, or special education services, to develop to maximum capacity (p. 3).

The categories of handicapping conditions which most commonly define the child's exceptionability are classified as mentally retarded; deaf or auditorily impaired; visually impaired; speech impaired; orthopedic or multiple handicaps; learning disabled; and behavior problems (Kirk and Gallagher, 1979).

In 1968 the United States Congress recognized that the paucity of services for handicapped children from birth through age eight resulted from the lack of model programs, and therefore, legislated the Handicapped Children's Early Education Program. This program, sometimes known as the First Chance Network (DeWeerd, 1977), was funded to develop experimental projects to serve as "demonstration models" to provide public schools and other agencies information for a variety of methods to serve preschool "handicapped children and their families" (p. 3).

DeWeerd (1977) concluded that these programs for young handicapped children are based around: "the basic needs, wants and problems" of the child as a person "with additional difficulties to overcome;" meeting the needs of the special child through "diagnosis, assessment, and planned programming;" the consideration of the total family, not of the child in "isolation;" the consideration of the handicapped child as a citizen with "the right to an education;" and the consideration of the "civil right to be included, to be visible" (p. 4).

Frost (1975) refers to the period of time from 1965-1975 as the "intervention decade" in American childrearing. During this period of time there has been a growth of knowledge concerning the role that adults play in the development of the young child. From his research on high risk

children, Frost states that 99 percent of these "mildly retarded" (50-75 IQ), do not indicate discernable neurological impairments. This suggests that environmental conditions "are probably responsible for most of the depressed intellectual functioning in our society" (p. 299). Health and environmental factors begin influencing the development of the child as early as conception; therefore, it is the responsibility of our society to improve the opportunities for each child in his environment.

In 1974, over 10 million children (15.5%) lived in families whose ability to rear children was severely handicapped by incomes below the poverty level (Solnit, 1976). Higher incidence figures are reported by some sources. A survey of Texas households in 1973 reported that 28 percent of all Texas families with children under six were living in poverty and that another 26 percent were living in near poverty (Texas Department of Community Affairs, 1974).

Health care is also a compounding factor, and is one which is not confined primarily to America's poor. According to Zigler (1976) approximately two-thirds of our children in the United States receive inadequate medical attention. Health experts voice a concern that it is not a lack of knowledge, but a void in commitment and concern for the guarantee of a system that will provide all children with a safeguard against "death-dealing and crippling disease" (p. 40).

The increased prevalence of divorce and single parent homes plus other social factors, places the child, particularly the handicapped child, in a most vulnerable position. From an investigation conducted by Light (1974) on neglected children the extent of child abuse indicates that one child in every hundred in America is physically abused, sexually molested, or severely neglected. In summary, poverty, neglect, poor health care, and other social characteristics of our society are but a few of the many factors which add to the number of children who are identified as handicapped.

The United States Department of Health, Education, and Welfare reported in 1976 that only about 50% of school age handicapped children were receiving specialized educational services. The estimate for preschool handicapped children was much lower. DeWeerd (1977) relates that there is evidence that programs providing early educational and therapeutic programming to meet the needs of young handicapped children and their families are reducing the number of children who need intensive or long term help. The emphasis should change from remediation of the handicap to prevention. This opportunity for improvement of the quality of life for the most vulnerable children, those in the early formative years, is increasing, however. The Public Law 94-142 amendments to the Education for All Handicapped Children Acts of 1975 call upon the states to establish policies to provide education

to all handicapped children between the ages of three and twenty-one by 1980.

The Texas State Comprehensive Plan of Special Education provides for educational programs for all handicapped children, ages three through twenty-one. This plan also includes educational provisions for students between birth and age 22, who are auditorially handicapped or visually handicapped (Department of Special Education, 1979, p. 2).

Curricula Base for Program Development

According to Hunt (1964) early experiences may be more important for perceptual, cognitive, and intellectual functions than for the emotional and temperamental functions. Mukerji (1968) discusses the challenges of early childhood education in relation to the formulation of psychological, conceptual, language, and creativity "roots" which provide the child a basis for future life experiences. This foundation leads to the curricular experiences and intervention strategies planned for the young handicapped child. Wood and Hurley (1977) state that the curricula which have been developed for young handicapped children within the Handicapped Children's Early Education Program (First Chance Network), Bureau of Education for the Handicapped, represent five basic methods: the "basic skill areas" approach; the "developmental tasks" approach; the "amelioration of deficits" approach; the "psychological constructs" approach; and the "educational content areas" approach (p. 134-135).

The curricula utilized in Project PEECH represent a blending of two approaches; the basic skills and the developmental tasks approach. In the basic skills approach the curriculum is concerned with the development of the child in the process of learning. Camp (1973) defines these skills as "necessary for cognitive growth and the development of intellectual competency" (p. 188). This approach allows for curriculum centered around sensory skills, abstracting and mediating skills, and response skills. Spodek (1973) describes the "developmental tasks" approach as dealing with "change in the human being over long periods of time" (p. 86). This provides a hierarchial sequence of tasks, skills, or content derived either from "normative information about the ways children develop or from developmental analysis of task complexity, usually related to chronological age or sequence of skills" (Wood and Hurley, 1977, p. 135).

In a review of the home-based models, such as Project PEECH, Karnes and Teska (1975) report that such programs require a higher degree of parental commitment. Two major strategies of the home-based delivery system were presented: the approach which trains the mother to be a more effective teacher of her child; and a tutorial approach which involves a professional or paraprofessional staff member who conducts the training (p. 216-217). The systems developed by Levenstein

(1971), Gordon (1970), and Weikart (1968) are examples of home-based programs where mothers were trained at home.

Two studies were conducted by Karnes, Teska, Hodgins, and Badger (1970), and Levenstein (1971) to determine if the children made gains resulting from parent training programs over a period of two years. The results showed a gain in intelligence of 16 IQ points. In these studies the effects of mother training on the siblings of target children also showed gains which supported evidence of transfer of training. In a review of a one-year study conducted by Kirk which involved infants tutored by professional home visitors in one hour sessions, five days a week, a 7 point IQ difference between the experimental and control subjects was reported at the conclusion of this study (Karnes and Teska, 1977).

Karnes and Teska (1975) report in a 1975 study on curricular variations that the structured programs showed modest gains while the highly structured programs emphasizing language development produced higher achievement. No single program has been established as representing the most effective method of intervention (p. 230). A review of some of the major programs for preschool handicapped children is made in the following paragraphs.

The Precise Early Education of Children with Handicaps Project (PEECH), University of Illinois, Urbana-Champaign

The Precise Early Education of Children with Handicaps Project developed in the latter part of the 1960's (Karnes

and Zehrbach, 1977) served children who are mildly to moderately multiply handicapped. The children are enrolled in a classroom which has one certified teacher and one paraprofessional for ten handicapped and five normal children. The classroom activities involved approximately two and one-half hour sessions each day. Parent involvement was an important component of the project. Karnes and Zehrbach's (1977) illustrate the organization of parental activities to meet individual needs of parents through:

> large group meeting, small group meetings, individual conferences, classroom observation, direct teaching in the classroom and at home, use of parent library and toy lending library, assistance to ancillary personnel, assistance in preparation of parent newsletter, policy making on an advisory board, and assistance in screening of children. In general, parents reflect on the community concern for the improved education of children and take a positive view of the program (p. 33).

An important development of the Precise Early Education of Children with Handicaps Program was the publication of the Comprehensive Identification Process (Zehrbach, 1975) which was designed and utilized to screen the young children to identify all handicapped children who need special programming. This instructional program model was derived from the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy, and Kirk, 1968) and is used as a guide to curriculum development. The Game Oriented Activities for Learning (GOAL, 1973) (Karnes, 1972) within this program was modified for usage with handicapped children. The mean IQ of all handi-

capped children and normal children enrolled in the program was 87, with a range in IQ of 35 - 125. Of the children enrolled in this program, 86 percent entered a regular education program, and only 14 percent were placed in a special program (Karnes & Zehrback, 1977).

The Model Preschool Center for Handicapped Children, Seattle, Washington.

The Model Preschool Center for Handicapped Children funded in 1964 was developed under the supervision of Dr. Alice Hayden as a part of the Experimental Education Unit in the College of Education Mental Retardation Center at The University of Washington. This center has a variety of programs serving handicapped children from birth to six years of age and has produced two which have been recognized as model programs. These programs were primarily center based with emphasis placed upon parental involvement. The Communications Program served two to six year old children with different types of communication deficits and other associated handicaps. This program emphasized a team approach (i.e., teacher, communication disorders specialist, and parent) to promote communication interaction and to provide opportunities to practice new language skills (Far West Laboratory, 1978, p. 4-11). The model program for Down's Syndrome children placed emphasis on strategies and procedures for providing a variety of classroom activities that foster

physical, personal-social, communication, and cognitive development through daily individualized instruction in pre-academic and academic skills. Parents participated in this program as teacher aides and data takers to learn techniques for maintaining the child's progress at home (Far West Laboratory, p. 4-34; Hayden, n.d.).

The Chapel Hill Project, Chapel Hill, North Carolina

The Chapel Hill Project, which was funded in the late 1960's, is a home and center based program which represents a collaborative endeavor between the Office of Child Development and the Bureau of Education for the Handicapped to maximize Head Start services to the handicapped. This program has served as a major resource to develop individualized approaches for all Head Start participants through the development and distribution of materials for serving handicapped children and their families. The Learning Accomplishment Profile (LAP) (LeMay and Sanford, 1977) was developed by the program staff for use as a diagnostic instrument. The curriculum guide, A Planning Guide to the Preschool Curriculum (Findlay, Miller, Pegram, Richey, Sanford, and Semgrau, 1976), also was developed by the program staff to assist teachers to work toward the specific behaviors addressed in the LAP. This program has been effective in collaborating with other agencies serving handicapped children. It has also facilitated services to

an increased number of children benefitting from a partial schedule of integrated experiences in a less restrictive environment (Sanford, Henley, Fabrizio, and Watkins, 1977).

The Portage Project, Portage, Wisconsin

A home based model, which served handicapped children from birth to six years of age in a rural, southern Wisconsin area, better known as the Portage Project (Shearer and Shearer, 1972) was funded in the late 1960's. The socioeconomic levels of the children ranged from poverty to the middle income level. About one-half of the children were considered mentally retarded, one-fourth had speech and language problems, and one-fourth were physically handicapped. An Early Childhood Curriculum Guide (Shearer, Billingsley, Frohman, Hilliard, Johnson, and Shearer, 1972) was devised by the project staff. This guide consisted of a developmental sequence checklist and a set of curriculum cards which were used to develop an individualized behaviorally oriented program for each child. The home teacher made weekly home visits to train the parent to conduct the prescribed activities. In an experimental study conducted by the staff, children were selected from the project for comparison with randomly selected children attending local classroom programs for culturally and economically disadvantaged preschool children. In this study Peniston (1975) reported the Portage Project participants IQ gains compared significantly to the classroom preschool children.

Project Ski Hi, Logan, Utah

In the early 1970's, Project Ski Hi, a statewide home intervention program for deaf or hearing impaired infants and young children ranging from birth to six years of age, was federally funded. The focus of the project's training services was the parents. Program data indicate the success in the child performance evaluations were directly related to the parent's ability to train their deaf and hearing impaired children. The curriculum provided: (1) a home hearing aid program, (2) a home communication program, (3) a home auditory program, (4) a home total communication program, and (5) a home language program. Parent advisors were trained to conduct home visits and supervise parttime advisors who made periodic visits. The home language program was maintained weekly for the first year followed with biweekly training sessions as long as the child remained in the program. In an analysis of program participants, the pre-post measures showed a gain of 16 months in language development during an 11 month treatment period. In another study the early-treatment group showed higher gains than the late-treatment group (Pefley and Smith, 1976).

Project ERIN: Early Recognition Intervention Network, Newton, Massachusetts

The Early Recognition Intervention Network, which was funded in the early 1970's, provided programming for children

two to seven years of age in a specialized preschool classroom/home program for children who were moderately to severely handicapped. This program also included regular early childhood and primary classes for children who were mildly to moderately handicapped. A learning profile, which was developed by the program, provided an overview of classroom activities for the teacher to utilize in both the mainstreamed and specialized setting. A conceptual framework and core method was implemented by regular teachers, special teachers, administrators, and parents within a variety of learning environments. The intent of this program was to facilitate quality education in the least restrictive environment, a major goal of Public Law 94-142, by providing a common language and problem solving method for teachers through a continuity of program within the regular and special education settings (Hainsworth and Hainsworth, 1977).

The Teaching Research Infant and Child Center Classroom for Moderately and Severely Handicapped Children, Monmouth, Oregon

An individualized skills instruction program for moderately to severely handicapped children, better known as the Infant and Child Center Classroom, was funded in the early 1970's. The Teaching Research Curriculum for Moderately and Severely Handicapped (Far West Laboratory, 1978, p. 8-25) is used as a basis for the skills to be taught. The child was

placed in one or more of the four curricular areas: self-help, motor, language, and cognitive. Volunteers were trained to implement the programs for each child under the supervision of the teacher. Approximately 85% of the parents of the project children participated in home instruction. The teaching periods in the home varied from 10 to 30 minute sessions and were coordinated with the school program (Fredricks, Baldwin, and Grove, n.d.). In a study conducted on the program using a multiple baseline approach, it was demonstrated that 64.4 skills per month were acquired with instruction, opposed to a mean of 7.9 skills per month acquired by a child without instruction (Far West Laboratory, 1978).

The Central Institute for Deaf Early Education Project, St. Louis, Missouri.

The Parent-Infant Model Program at the Central Institute for the Deaf in St. Louis, Missouri, focused on deaf children from birth to three years of age. This program, funded in the early 1970's, was centered around a Home Demonstration Center, composed of two apartments which resemble a typical home. The parent observes the teacher of the deaf conducting sessions in this home-like setting which was centered around typical daily household activities that utilize the home as the center for the learning environment. Short nursery school sessions, in which parents participated, were conducted for the children beginning at two years of age to develop

the social and behavioral skills necessary for social-communicative and verbal interaction. The parents also participated in group meetings which were conducted twice monthly. The basic goal of the program is to

> "develop the parent as the designer, the modeler, consultant and authority figure who can maximize the development of his handicapped child" (Karnes and Zehrbach, 1977, p. 4).

In an evaluation of the program the ratings of the children's language ability increased consistently and reliably as opposed to the language ability of children who did not receive intervention (Far West Laboratory, 1978, p. 4-8).

Some of the other nationally known programs utilizing home-based instruction which were located in the western section of the United States were: The San Luis Valley Early Education and Home Intervention Project for the Handicapped, Alamosa, Colorado; Project Vision-Up, Gooding, Idaho; the Sewall Early Developmental Program (SEED), Denver, Colorado (Karnes and Zehrbach, 1977). Programs located in the southern part of the United States included: the Rural Infant Stimulation Environment Project, University of Alabama; the PEACH (Program for Early Attention to Children with Handicaps) Project, Memphis, Tennessee; the Magnolia Preschool Handicapped Project, Southwestern Arkansas; the Ochlocknee and Multi-Handicapped Project, Southwestern Georgia; and the Project for Early Education of Exceptional Children Children (PEEC), Murray, Kentucky (Karnes and Zehrbach, 1977).

Within the State of Texas Macy Research Associates (1978) evaluated the effectiveness of early intervention programs. The State supported programs included in this study were: the Travel Learning Center, Silsbee Independent School District; Project FAITH (Family Assistance for Infants and Toddlers with Handicaps), Longview Independent School District; Project Throutwo, West Texas Rehabilitation Center, Abilene; Project PIP (Parents in Partnership), Garland Independent School District; and Project Happy Child, Columbia-Brazoria Independent School District. The Texas federally funded programs included: the Developmental Education Birth through Two (DEBT Project), Lubbock Independent School District; the Infant-Parent Training Program, Austin-Travis County Mental Health/Retardation Center, Austin; the Comprehensive Infant Intervention Program, Edgewood Independent School District, San Antonio; and Project KIDS (Kindling Individual Development Systems), Dallas Independent School District. These programs utilized the combination home-center service delivery model and provided educational services to children ranging in age from 14 to 28 months. The primary handicapping conditions accounted for in the programs were mental retardation, developmental delays, orthopedic problems, and other health impairments.

Programs for young handicapped children emphasizing the home-teaching process appear to have similar objectives, but

exhibit variation in the following components: utilization of paraprofessionals as home teachers; strong inservice training for program staff; dependency of strong parental involvement; and provision of services to mildly to severely handicapped. In the delivery of program services, Ramey, Holmberg, Sparling and Collier (1977) show the selection and training program for the teaching staff as the "framework" of a successful program. They discuss the premises upon which a successful program is built:

> the importance of children having teachers who represent the ethnic and cultural values of the children's home . . . the importance of staff being involved in applied studies directly relevant to everyday teaching procedures . . . a related guidelines for staff development--to develop skills analyzing child behaviors (p. 115).

Fredricks, Baldwin, and Grove (n.d.) state that it is critical to coordinate educational activities and training for a child to acquire the important self-help skills (i.e., toilet training) and language skills. Therefore, the early childhood models are not only individualizing educational programs for the young child, but in addition, are providing systems for training the parents of the handicapped child.

Chapter 3

Procedures

The purpose of this study was to determine the long-term effects of the early intervention program (PEECH) with respect to the following: (1) the gains made during intervention versus the gains made following intervention in relation to self-help skills, social skills, physical skills, communication skills, academic skills, intelligence, and mental age; and (2) the relationship of the category of handicapping condition to the subsequent educational placement.

This chapter provides information categorized in the following manner: (1) a description of the population, (2) a description of the subjects, (3) the selection of the sample, (4) the representativeness of the sample, and (5) a description of the instruments. The statistical analyses performed on the data for hypotheses testing are also discussed.

Description of the Population

This study was limited to an analysis of the accumulated data for those children who participated in the PEECH program. Children who participated were identified as handicapped and whose parents expressed a desire to work with them at home. Pre-post data were collected on each child during the program intervention period. Follow-up

data were collected for each year for three years subsequent to the intervention program on children who still lived within the geographical area included in the project.

Description of the Subjects

The subjects in this research were the 1972-75 Project PEECH participants who remained in the geographical area served by the project. This long-term study on 43 preschool handicapped children was composed of Group 1 (N = 14; time in program = one year with followup two years subsequent to intervention), group 2 (N = 18; time in program = two year with followup two years subsequent to intervention), and group 3 (N = 11; time in program = one year with one and three years subsequent follow-up).

The composition of the ethnic origin of the participants was 88% Causasian American and 12% Black American. The sex composition of the group was 55% male and 45% female. The mean age of group 1 (N = 14) was 36.3 months upon entrance into the program with the upper range of 59.9 months and the lower range of 5.3 months. The mean age of group 2 was 42.5 months upon entrance into the program with the upper range of 58.5 months and the lower range of 28.2 months. The composition of the ethnic origin of group 1 was 93% Caucasian American and 7% Black American while 89% of group 2 was Caucasian American and 11% Black American. The mean age of the N = 43 group was 41.2 months upon entrance into the

program with an upper range of 68.9 months and a lower range of 5.3 months.

Of the 43 handicapped children, 20 (47%) displayed language deficits, 13 (30%) were mentally retarded, 3 (7%) were blind or visually impaired, 3 (7%) displayed severe behavior disorders, and 4 (9%) were physically handicapped.

Selection of the Sample

Over 200 subjects referred as handicapped were served by Project PEECH. These subjects were selected on the following basis: an identified handicapping condition; a developmental delay of six months or more in two skill areas (self-help, social, communication, physical, and academic); and a commitment by the principle caregiver for regular participation in the program. For a variety of reasons, however, complete sets of data were available for only 99 subjects. A complete set of data was interpreted as at least one entrance examination (5 Alpern-Boll measures plus Binet IQ and MA scores) and a complete exit examination (5 Alpern-Boll measures, and Binet IQ and MA scores).

This study, however, is concerned primarily with long-term followup. For purposes of this study, long-term follow-up was defined as the administration of the complete PEECH battery (5 Alpern-Boll measures plus Binet IQ and MA scores) at an interval of approximately two years subsequent to Exit from the program.

For a subset of 32 of the original 99 subjects, a long term follow-up evaluation was available. This subset of 32 subjects was examined with respect to the nature of the in program data available. It was found that the 32 subjects could be divided into two groups. Group 1, with an N of 14, consisted of children for whom entrance and exit evaluations were available and for whom the intervention period had lasted approximately eight to nine months. For the remaining 18 in Group 2, it was found that in program data were available at entrance, at the end of the first year, and at exit with a time lapse of approximately 20 months between the initial entrance examination and the final exit evaluation. These 32 subjects were then divided into group 1 (N = 14; time in program = 1 year) and group 2 (N = 18; time in program = 2 years).

An additional subset of 11 subjects was included in the study of educational placement. The program data for this group of 11 was not consistent with the time incurred in the data analyzed in group 1 and 2. These 11 subjects participated in the program one year with follow-up data collected on 4 of the subjects 3 years following intervention and follow-up data collected on 7 of the subjects 1 year following intervention. These 43 subjects, group 1 (N = 14), group 2 (N = 18), group 3 (N = 11) were examined in terms of educational placement.

Representativeness of the Sample of 32

Because the purpose of the study was to demonstrate the long term follow-up effects of participation in the PEECH program, it was necessary to establish that the subset of 32 was representative of the remaining children (99 - 32 = 67) in the program for whom follow-up data were not available. It was found that of the 67 children (99 - 32), the data on 15 of the program participants did not agree with the 32 subjects. The interval period between the entrance and exit examinations were too long (exceeded 25 months) or too short (less than 6 months). For this reason, 15 children were dropped from the 67 remaining participants (67 - 15 = 52). The representativeness of the 32 thesis subjects were then compared with the 52 remaining children on whom comparable intervention data were available.

Description of the Instruments

The instruments utilized as pre-post assessment measures included the Alpern-Boll Developmental Profile and the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale. These tests were administered independently during each program year. The dates of administration were during September and May of each program year and subsequent years through May, 1978.

The Alpern-Boll Developmental Profile is a skills inventory which is designed to assess a child's development

from birth to pre-adolescence. The major goals of the authors of the Developmental Profile were to: provide a multidimensional description of children's development; provide an inventory which has no bias as to function of race, sex, and social class; develop a quick, inexpensive, but accurate description of children's development; and permit administration, scoring, and interpretations of the tests by people other than psychologists. The Developmental Profile is arranged in five scales; physical, self-help, social, academic, and communication. Each scale contains items arranged according to age levels. The age levels advance in six month intervals from birth to three and one-half years and continue on from that point at one-year intervals. The five scales contain a total of 217 items. Reliability studies made on the Developmental Profile have revealed that the instrument generates scores with extremely high scorer, reporter, and test-retest reliability (Alpern-Boll, 1972).

The Stanford-Binet Intelligence Scale is an age scale and measures mental activities which fall under the general category of general intelligence. The 1960 revision, which is not a restandardization, is based on the 1937 standardization. The age range extends from two years to the adult level (Anastasi, 1970).

The Cattell Infant Intelligence Scale was developed as a downward extension of the 1937 Stanford-Binet, Form L. The Cattell scale extends from two to thirty months. This scale utilized the Stanford-Binet items, material from the Gesell Developmental schedules, and other infant tests. The age levels are spaced at intervals of one month during the first year; at two month intervals during the second year; and at three month intervals during the first half of the third year. The test is followed by the Stanford-Binet if the child passes any test at the thirty month level. The placement of items in the Cattell scale was adjusted to yield approximately the same median IQ as that obtained by each group on the Stanford-Binet (Anastasi, 1970).

Collection of the Data

The three instruments employed for data collection were the Alpern-Boll Developmental Profile and the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale. These tests were administered independently during each program year (September and May) and each spring (May) following termination of the program (1975) through May, 1978. The data collected from the Alpern-Boll Developmental Profile reveal developmental skill ages in: self-help skills, social skills, physical skills, communication skills, and academic skills. The Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale provides mental ages

and intelligence quotients. This study also analyzed the relationship between the category of the handicapping condition and subsequent educational placement.

The mean gain scores for each subject were collected from the pre- (entrance) and post- (exit) data of two test instruments; the Alpern-Boll Developmental Profile and the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale. The first instrument, the Alpern-Boll Developmental Profile, provides developmental scores in the areas of self-help skills, social skills, physical skills, communication skills, and academic skills which are expressed in developmental months. The second instrument, the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale, provides an intelligence quotient and a mental age.

An analysis of the relationship of the pre-handicapping condition and subsequent educational placement was made. The category of handicapping condition relating to the five areas served (language delayed, mentally retarded, physically handicapped, blind or visually impaired, or behaviorally disordered) was determined by the Alpern-Boll Developmental Profile entrance scores in combination with the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale. Subsequent educational placement was examined and categorized as regular classroom placement or special education placement.

Analysis of the Data

Inasmuch as no control group was used, the analysis of the longitudinal data included 43 of the original 99 program participants. The study of the longitudinal data was conducted in two parts. The first analysis was concerned with the follow-up data of the 32 participants to determine whether the gains were maintained following intervention. The second analysis was a descriptive study of the 43 subjects to determine if there was an educational relationship between the identified handicapping condition upon program entrance and the subsequent educational placement.

The subjects for which data were analyzed are presented in Tables 1, 2, and 3. Table 1 displays the subjects who participated in the program for one year and who had follow-up data collected two years subsequent to intervention. The subjects who participated in the program two years and who had followup data collected two years subsequent to intervention are shown in Table 2. It should be noted that the underlined portion of Tables 1 and 2 indicate the data utilized in both analyses. Table 3 presents the subjects who participated in the program one, two, and three years, and who had followup data one, two, and three years subsequent to the program. A descriptive study was conducted on these subjects to determine if the original handicapping condition was educationally meaningful in the subsequent educational

placement of the young child. It should be noted that the underlined portion in Tables 1 and 2 indicate the entry and follow-up categories utilized in the descriptive study.

Table 1

Group 1 (N = 14; Time in Program = 1 Year with Final Exit Evaluation Examination 2 Years Subsequent to Intervention)

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Study Made In The Spring 76	77	78
008		X		X		
055		X		X		
061		X		X		X
102			X	X	X	X
103			X	X	X	X
106			X	X	X	X
118			X		X	
132			X	X	X	
141			X		X	X
143			X	X	X	X
160			X	X	X	X
161			X	X	X	X
167			X	X	X	
172			X	X	X	X

NOTE: Data for years underlined were analyzed

Table 2

Group 2 (N = 18; Time in Program 2 years with Final Exit Evaluation Examination 2 Years Subsequent to Intervention)

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Study Made In The Spring 76	77	78
001		X	X	X	X	X
002		X	X	X	X	X
009		X	X	X	X	X
011		X	X		X	X
026	X	X		X		
027	X	X		X		
030		X	X	X	X	X
033		X	X	X	X	X
034		X	X		X	X
045	X	X	X	X	X	
048		X	X	X	X	X
050		X	X		X	
056		X	X	X	X	X
057	X	X		X		X
058	X	X		X		X
059		X	X	X	X	X
068		X	X	X	X	X
072		X	X	X	X	

NOTE: Data for years underlined were analyzed

Table 3

Total Group of 43 with Data on Entry Handicapping Condition and Subsequent Educational Placement

Identification Code	Intervention Program			Follow-up Studies		
	Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Made Each Spring 76	77	78
001		X	X	X	X	X
002		X	X	X	X	X
008		X		X		X
009		X	X	X	X	X
010		X			X	X
011		X	X		X	X
026	X	X	X	X		
027	X	X		X	X	
030		X	X	X	X	X
033		X	X	X	X	X
034		X	X		X	X
038		X			X	X
040		X			X	
045	X	X	X	X	X	X
048		X	X	X	X	X
050		X	X	X	X	
055		X		X		
056		X	X	X	X	X
057	X	X		X		X
058	X	X		X		X
059		X	X	X	X	X
061		X		X	X	X
068		X	X	X	X	X
072		X	X	X		
102			X	X	X	X

Table 3, Continued

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Studies Made Each Spring 76	77	78
103			X	X	X	X
106			X	X	X	X
107			X	X		
108			X	X		
118			X	X	X	
121			X	X		X
122			X	X		
123			X	X		
132			X			X
133			X	X		
135			X	X		
141			X	X	X	X
143			X	X	X	X
148			X	X		
160			X	X	X	X
161			X	X	X	X
167			X	X	X	
172			X	X	X	X

NOTE: Fifty-six of the original ninety-nine participants did not participate in follow-up studies.

Standard deviations and mean chronological age data in months for the entrance, exit, entrance minus exit, follow-up, and follow-up minus exit were compiled for the following groups: group 1 (N = 14; 7 females and 7 males), and group 2 (N = 18; 7 females and 11 males).

The representativeness of the follow-up group (N = 32) was tested using the multivariate one-way analysis of variance to ascertain comparison of the N of 52 and the N of 32. The multivariate analysis of variance was applied for the six tests to compare the magnitude of gain while in the program (exit minus entrance), the gain differences made subsequent to the program (follow-up minus exit) within group 1 and group 2, and a comparison between the two groups involved in the study. Both non-compensated and compensated means (Irwin and Wong, 1974) were used to determine the statistical significance of the gains made.

The compensated technique can be used only with instruments that are scored in ages. In this technique, the assumption is made that the rate of development manifested by each subject in each domain will remain constant during the intervention period. The compensated post- value, then is the difference between the projected post- value and the actual post- value. The compensated post- value is, in short, a mathematical correction for maturation. Through the Irwin-Wong technique, the intervention effect is systematically reduced with respect to the unmanipulated difference score. Thus tests of statistical significance are more stringent for compensated values than for manipulated change scores, particularly if the intervention time is great. All null hypotheses were accepted or rejected at or beyond the .05 level of significance.

A descriptive study was made of the total group (N = 43; 19 females and 24 males) to compare the identified category of handicap upon program entrance with subsequent educational placement.

Chapter 4

Description and Analysis of the Data

It is the purpose of this chapter to report the analyses of the various data obtained from the follow-through studies of the children who participated in Project PEECH for this research project to determine the significance of the rate of gains maintained following intervention.

Data were collected using these instruments: The Alpern-Boll Developmental Profile, the Stanford-Binet Intelligence Scale, and the Cattell Infant Intelligence Scale. This section of the study includes data procured from each instrument and the analysis of the results for each hypothesis. The alpha level of .05 was applied to test the hypotheses.

Hypotheses

In this investigation of the long term program effects of early intervention for young handicapped children the following five hypotheses were tested:

$H_o^{(1)}$: There will be no significant difference for group 1 (N = 14) between the mean gain scores made during one year of intervention and the mean gain scores measured two years following intervention in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(2)}$: There will be no significant difference for group 2 (N = 18) between the mean gain scores made during two years of intervention and the mean gain scores measured two years following intervention in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(3)}$: There will be no significant difference between the mean gain scores of group 1 (N = 14) made during one year of intervention and of group 2 (N = 18) with two years of intervention as measured in the areas of self-help skills, socialization skills, communication skills, physical skills, academic skills, intelligence, and mental age.

$H_o^{(4)}$: There will be no significant difference in the mean gain scores made two years subsequent to intervention by the two year intervention group (N = 18) as compared to the mean gain scores made by the one year intervention group (N = 14) as measured in the areas of self-help skills, socialization skills, communication skills, academic skills, intelligence, and mental age.

$H_o^{(5)}$: There will be no meaningful difference in the category of handicap upon entrance in the program and in the subsequent educational placement.

Presentation of the Data

From 1972 to 1975, Project PEECH provided home-centered, educational services to selected rural children.

From the outset, the project sought to measure the progress of the children by the use of the Alpern-Boll, the Stanford-Binet, and the Cattell. The distribution of the mean chronological age data for group 1 (N = 14) with one year of intervention are presented in Table 4. The mean chronological age of the group of 14 was 42.5 months upon entrance in the program with maximal and minimal ages of 58.5 and 28.2 months. Follow-up data was collected at a mean chronological age of 73.9 months with maximal and minimal ages of 90.6 and 60.3 months. The mean time between entrance and exit of the total group was 7.1 months with a maximal and minimal range of 7.7 and 5.0 months. The mean collection time for the followup data was 24.3 months with a maximal and minimal time ranging from 24.8 months to 22.6 months.

In a comparison of sex Table 4 (page 61) shows there were 7 females and 7 males in the subset of 14. The mean chronological age of the females was 74.4 months upon entrance into the program with maximal and minimal ages of 58.5 and 30.1 months. In the follow-up study the mean chronological age of the females was 73.9 months with upper and lower limits of 90.6 and 60.8 months. The mean time for the follow-up study of the females was 24.4 months. The males mean chronological ages was 42.7 months upon entrance into the program with maximal and minimal ages of 52.2 and 28.2

months. Data were collected for follow-up at a mean chronological age of 73.9 months with maximal and minimal ages of 83.6 and 60.3 months. In the upper and lower age range display the females were 6.3 months older than the males at the maximal age entrance to the program and 1.9 months older than the boys at the minimal age range.

Table 4

Chronological Age Data in Months on 14 Children for One Program Year in PEECH and the Two Calendar Years Subsequent to the Program

Measurements	Subjects		Statistic			
	Sex	N	Mean	Standard Deviation	Range Upper	Range Lower
Entrance	F	7	42.4	11.6	58.5	30.1
	M	7	42.7	8.9	52.2	28.2
	F + M	14	42.5	9.9	58.5	28.2
Exit	F	7	49.5	11.9	65.9	36.0
	M	7	49.7	8.7	59.8	35.5
	F + M	14	49.6	10.0	65.9	35.5
Exit Minus Entrance	F	7	7.1	.7	7.6	5.6
	M	7	7.0	1.0	7.7	5.0
	F + M	14	7.1	.8	7.7	5.0
Two Year Follow-Up	F	7	73.9	11.7	90.6	60.8
	M	7	73.9	8.6	83.6	60.3
	F + M	14	73.9	9.8	90.6	60.3
Follow-Up Minus Exit	F	7	24.4	.8	24.8	22.6
	M	7	24.3	.9	24.8	23.0
	F + M	14	24.3	.8	24.8	22.6

Table 5 presents the distribution of the mean chronological age data for group 2 (N = 18) with two years of intervention. This chart depicts the mean entrance age, the mean interim age between the first and second year of intervention, the mean exit age, and the mean age at the time of the two year follow-up study. The description of the total group shows a mean chronological age of 36.3 months with maximal and minimal ages of 59.9 and 5.3 months upon entrance to the program. Follow-up data was recorded with a mean chronological age of 79.6 months with maximal and minimal ages of 104.1 and 46.8 months. The mean time between entrance and exit from the program for the total group was 18.9 months with maximal and minimal range from 21.3 to 17.0 months. The follow-up data was recorded at a mean time of 24.4 months with maximal and minimal time from 25.2 to 23.2 months.

Table 5 also presents comparative data relating to sex of the subjects. The mean chronological age upon entrance to the program for the 7 females was 40.3 months with maximal and minimal ages of 59.9 and 5.3 months. The mean chronological age for the 11 males upon entrance to the program was 33.8 months with maximal and minimal ages of 56.2 and 10.3 months.

Table 5

Chronological Age Data in Months on 18 Children for Two Program Years in PEECH and the Two Calendar Years Subsequent to the Program

Measurements	Subjects		Statistic			
				Standard	Range	
	Sex	N	Mean	Deviation	Upper	Lower
	F	7	40.3	19.2	59.9	5.3
Entrance	M	11	33.8	13.4	56.2	10.3
	F + M	18	36.3	15.7	59.9	5.3
First	F	7	47.5	19.8	67.6	10.6
Program	M	11	40.6	13.8	64.1	16.0
Year	F + M	18	43.2	16.2	67.6	10.6
First Year	F	7	7.2	1.5	9.4	5.1
Minus	M	11	6.8	1.4	7.9	4.3
Entrance	F + M	18	7.0	1.4	9.4	4.3
	F	7	59.4	19.9	79.4	22.4
Exit	M	11	52.5	13.6	75.6	27.8
	F + M	18	55.2	16.2	79.4	22.4
Exit	F	7	19.1	1.4	21.3	17.1
Minus	M	11	18.7	1.0	19.4	17.0
Entrance	F + M	18	18.9	1.1	21.3	17.0
Two	F	7	83.8	19.8	104.1	46.8
Year	M	11	76.9	13.7	100.1	52.5
Follow-Up	F + M	18	79.6	16.1	104.1	46.8
Follow-Up	F	7	24.4	.5	24.8	23.3
Minus	M	11	24.4	.6	25.2	23.2
Exit	F + M	18	24.4	.6	25.2	23.2

The descriptive study of the 43 subjects (14 + 18 + 11) was concerned with the handicapping condition upon entrance into the program and the subsequent educational placement. The additional 11 subjects had one year of intervention and follow-up data one or three years subsequent to intervention. Since data were not consistent with the two year follow-up data, the mean chronological age of each of the 11 subjects was calculated as an individual group and is shown in Table 6. The mean chronological age of the group upon entrance into the program was 44.7 months with maximal and minimal ages of 68.9 and 27.1 months. The mean chronological age of the group at the time the follow-up data was collected was 72.7 months with maximal and minimal ages of 110.8 and 46.2 months.

In a comparison of sex which is presented in Table 6, the mean chronological age of the 5 females was 44.3 months with maximal and minimal ages of 63.4 and 27.4 months. There were 6 males in this group with a mean chronological age of 45.1 months with an upper and lower range of 68.9 and 27.1 months. At the time of collection of the follow-up placement the mean chronological age of the females was 73.4 months with maximal and minimal ages of 90.8 and 46.2 months. The mean chronological age of the males was 72.7 months with an upper and lower range of 110.8 and 50.8 months. The maximal age of the group of 11 is at least 6.7 months older than the

group of 14 and the group of 18 at the time of follow-up. The mean age of the intervention time was 7.4 months, with a mean follow-up time of 20.5 months.

Table 6

Chronological Age Data in Months on 11 Children for One Program Year in PEECH with Subsequent Educational Placement Data

Measurements	Subjects		Statistic			
	Sex	N	Mean	Standard Deviation	Range Upper	Range Lower
Entrance	F	5	44.3	13.8	63.4	27.4
	M	6	45.1	14.1	68.9	27.1
	F + M	11	44.7	14.0	68.9	27.1
Exit	F	5	51.7	14.0	71.1	34.4
	M	6	52.6	14.1	76.5	34.9
	F + M	11	52.2	14.0	76.5	34.4
Exit Minus Entrance	F	5	7.4	.5	7.8	7.0
	M	6	7.5	.6	8.0	7.3
	F + M	11	7.4	.5	8.0	7.0
Follow-up	F	5	73.4	15.0	90.8	46.2
	M	6	72.1	18.4	110.8	50.8
	F + M	11	72.7	17.2	110.8	46.2
Follow-up Minus Exit	F	5	21.6	12.0	36.7	11.7
	M	6	19.5	10.7	35.1	12.
	F + M	11	20.5	11.3	36.7	11.7

Data Analysis

The analysis is presented in six major parts: (1) a study to determine the representativeness of the 32 subjects (14 +18); (2) a comparison of the progress made during two years of intervention (N = 18) with the progress made two years subsequent to intervention; (3) a study of the progress made during one year of intervention (N = 14) with the progress made during two years subsequent to intervention; (4) a comparison of the progress made by the one year intervention group (N = 14) and the progress made by the two year intervention group (N = 18); (5) an analysis of the progress made by the two year group (N = 18) with the one year group (N = 14) during the two years subsequent to intervention; and (6) a descriptive study comparing the category of handicapping condition upon entrance to the program with subsequent educational placement for an N = 43. Compensated age values (Irwin and Wong, 1974) are reported in this study for all measures except IQ. However, the raw entry-, exit-, follow-up values are also included in the summary tables.

Entry, exit, and follow-up data were collected on two instruments: The Alpern-Boll Developmental Profile and the Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Test. From the selected instruments, seven subtests or measures can be derived. These, in the order in which they were coded for the computer, are: Alpern-Boll

Physical, Alpern-Boll Self-Help, Alpern-Boll Social, Alpern-Boll Academic, Alpern-Boll Communication, Stanford-Binet/or Cattell Intelligence and Stanford-Binet/or Cattell Mental Age.

Representativeness of Follow-up Group

An analysis of the data for the study of representativeness was conducted to demonstrate that the 32 subjects (N = 14 and N = 18) were representative of the PEECH participants (99). It was found that of the 67 subjects (99 - 32) 15 did not agree with the 32 subjects. For example, the interval between entrance and exit exams was too long or too short. These 15 subjects were dropped from the 67 remaining (67 - 15) and the 32 dissertation subjects (14 + 18) were then compared with the 52 remaining subjects.

In this study the differences in the entrance non-compensated values, the exit non-compensated values, and the difference non-compensated values were studied. A one-way factorial analysis of the two levels (N = 52 and N = 32) was conducted. The multivariate for the entrance of the N = 52 was not significant, F (7, 76) = 1.73, $p < .12$. In the analysis of the exit (post) data the multivariate was not significant, F (7, 76) = .68, $p < .68$. The final test of significance was made on the difference values, and the multivariate was found not to be significant, F (7, 76) = 1.62, $p < .14$.

The basic cell data for the study of representativeness is shown in Appendix C. Table C in Appendix C shows the basic entrance, exit, and difference values by test. For IQ, the univariate F-ratio for the difference value was significant, F (1, 82) = 7.01, $p < .01$ (See Appendix C, Table D). It may be argued that the conclusions for the group of 32 would be reasonable for the group of 52.

Hypothesis 1

For the fourteen subjects with one program year, the analysis compares the progress made during the one year of intervention with the progress made during the two years subsequent to intervention. Table 7, page 69, reports the comparison in months which was made on the five measures of the Alpern-Boll gain, the Stanford-Binet intelligence, and mental age using compensated means.

In the analysis of variance for each of the seven tests, the data were calculated for differences in compensated gains between the time in program and the time not in the program. In the one sample F test, the multivariate was not significant, F (7, 7) = 1.03, $p < .49$. Table 8, page 70, presents the univariate F-ratio for all seven tests. No univariate was significant.

Table 9, page 70, reports the mean developmental gains by sex of the 14 subjects. In the one sample F test between sexes, the multivariate was not significant, F (6, 7) = .52, $p < .79$.

Table 7

Comparison in Months on Six Measures Using Age Compensated Means and IQ of Two Year Follow-up Gains and One Year Program Gains (N = 14)

Time Base	Statistic	Measurement A-B Physical	A-B Self-Help	A-B Social	A-B Academic	A-B Communi-ication	Binet/ Cattell IQ	Binet/ Cattell MA
Follow-up	$\bar{X}$	55.3	56.0	59.5	48.4	52.2	92.0	49.6
	SD	18.9	24.9	19.6	12.3	19.8	27.4	19.0
Exit	$\bar{X}$	51.4	58.1	52.0	48.0	45.1	87.7	45.5
	SD	21.5	22.0	18.1	19.5	18.0	23.8	18.3
Difference A	$\bar{X}$	3.9	-2.2	7.5	.4	7.1	4.3	4.1
	SD	24.0	26.7	20.9	12.4	17.6	15.9	11.2
Exit	$\bar{X}$	44.8	51.2	8.9	42.2	39.0	87.7	39.9
	SD	19.0	19.5	6.8	18.5	16.3	23.8	16.7
Entrance	$\bar{X}$	40.9	43.1	43.1	35.4	37.3	77.2	34.6
	SD	22.3	22.0	19.1	12.9	16.5	22.9	15.4
Difference B	$\bar{X}$	3.9	8.0	1.6	6.7	1.7	10.5	5.2
	SD	9.3	13.4	9.0	8.9	8.4	15.3	5.4
A Minus B	$\bar{X}$	0.0	-10.2	5.8	-6.4	5.4	-6.2	-1.2
	SD	24.6	35.4	22.0	19.6	19.5	23.1	12.7

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Table 8

Analysis of Variance
Using Compensated Scores for Six Measures
and Non-Compensated Scores for IQ (N = 14)

Measurement	Univariate F	df	Probability
A-B Physical	.000	1,13	.99
A-B Self-Help	1.16	1,13	.30
A-B Social	.99	1,13	.34
A-B Academic	1.48	1,13	.25
A-B Communication	1.07	1,13	.32
S-B/Cattell IQ	1.02	1,13	.33
S-B/Cattell MA	.12	1,13	.74

Table 9

Mean Developmental Gain in Months Using
Compensated Means for Six Measures and
Non-Compensated Scores for IQ (N = 14)

Measurement	Statistic	*Sex	
		F	M
A-B Physical	$\bar{X}$	.5	-.5
	SD	21.6	29.0
A-B Self-Help	$\bar{X}$	-5.1	-15.3
	SD	33.9	38.9
A-B Social	$\bar{X}$	9.4	2.3
	SD	22.8	22.3
A-B Academic	$\bar{X}$	-12.7	.0
	SD	23.7	13.3
A-B Communication	$\bar{X}$	9.5	1.3
	SD	19.4	20.3
Binet/Cattell IQ	$\bar{X}$	-8.3	-4.1
	SD	17.6	28.9
Binet/Cattell MA	$\bar{X}$	-.9	-1.4
	SD	9.9	15.8

*N=18 (7F and 7M)

Table 10 presents the univariate F-ratio. Compensated scores were used, thus compensating at least in part for the difference in the time of in-program and out-of-program. None of the univariate F-ratios was significant, suggesting that the rate of progress established by females and males was similar.

Table 10

Analysis of Variance Between Sexes Using Compensated Scores for Six Measures and Non-Compensated Scores for IQ (N = 14)

Measurement	Univariate F	df	Probability
A-B Physical	.0047	1,12	.95
A-B Self-Help	.2698	1,12	.61
A-B Social	.3467	1,12	.57
A-B Academic	1.5303	1,12	.24
A-B Communication	.6013	1,12	.45
S-B/Cattell IQ	.1052	1,12	.75
S-B/Cattell MA	.0049	1,12	.94

For the N = 14 group, the null hypothesis cannot be rejected. With the use of the compensated scores, the analysis suggests that the rate of progress established while in

the program is maintained subsequent to exit from the program.

Hypothesis 2

For the eighteen subjects with two program years, the analysis compares the progress made during the two program years with the progress made two years subsequent to intervention. Table 11 presents a comparison of the gains in months made on the five measures of the Alpern-Boll and the Stanford-Binet/Cattell mental age using compensated means, and the Stanford-Binet/Cattell intelligence. The important comparison of this table is the difference in the gains made while in the program (Difference B or exit minus entrance) and the difference made subsequent to the program (Difference A or follow-up minus exit).

In the analysis of variance for the six tests, the differences in compensated gains between the time in program and the time not in the program were computed. The compensated gain formula was not applied to intelligence. The multivariate for the difference between gains in the program and not in the program was significant, F (7, 11) = 3.85, $p < .02$. Table 12 shows the univariate F-ratios for each of the six measures using compensated scores and for IQ. The test between gains on IQ and mental age was significant, F (1, 17) = 29.15, $p < .0001$; F (1, 17) = 18.29, $p < .0006$.

Table 11

Comparison in Months on Six Measures Using Age Compensated Means and IQ of Two Year Follow-up Gains and Two Year Program Gains (N = 18)

Time Base	Statistic	Measurement A-B Physical	A-B Self-Help	A-B Social	A-B Academic	A-B Communi-ication	Binet/ Cattell IQ	Binet/ Cattell MA
Follow-up	$\bar{X}$	53.1	56.3	53.8	46.9	47.0	80.3	43.3
	SD	24.7	28.8	24.0	17.7	22.4	18.2	18.3
Exit	$\bar{X}$	50.2	64.0	57.1	47.3	47.3	90.8	50.6
	SD	23.4	23.6	18.9	16.3	16.0	15.9	15.6
Difference A	$\bar{X}$	2.9	-7.7	-3.3	-.4	-.4	10.5	-7.3
	SD	16.3	21.9	16.0	12.8	17.2	13.6	11.4
Exit	$\bar{X}$	33.9	45.6	39.8	33.4	33.3	90.8	36.3
	SD	22.8	21.2	17.6	16.2	14.2	15.9	15.1
Entrance	$\bar{X}$	32.4	38.2	34.1	26.6	27.3	71.0	26.7
	SD	21.7	27.8	18.4	13.2	16.1	19.5	14.0
Difference B	$\bar{X}$	1.5	7.4	5.7	6.8	6.0	19.8	9.6
	SD	25.2	28.3	16.0	14.3	15.9	16.3	10.9
(A - B)	$\bar{X}$	1.4	-15.1	-9.0	-7.2	-6.3	-30.33	-16.9
	SD	34.7	36.9	25.0	24.1	25.7	23.84	16.8

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Table 12

Analysis of Variance Using
Compensated Scores for Six Measures and
Non-Compensated Scores For IQ (N = 18)

Measurement	Univariate F	df	Probability
A-B Physical	.03	1,17	.87
A-B Self-Help	2.99	1,17	.10
A-B Social	2.33	1,17	.15
A-B Academic	1.61	1,17	.22
A-B Communication	1.09	1,17	.31
S-B/Cattell IQ	29.15	1,17	.0001
S-B/Cattell MA	18.29	1,17	.0006

In a comparison study made between sex of the N = 18 there were 7 females and 11 males. Table 13 presents the mean developmental gains in months using compensated scores for the six tests and the mean developmental gains for IQ using non-compensated scores. The multivariate analysis of variance between sex was not significant, F (7, 10) = 2.13, $p < .14$.

In Table 14 the univariate F-ratio is presented using compensated scores for the six measures and for intelligence. Only the Alpern-Boll Self-Help and the Alpern-Boll Academic

measure was significant, F (1, 16) = 6.27, $p < .02$; F (1, 16) = 4.74, $p < .05$. From these comparisons it can be assumed there was no difference between the gains made between sex.

Table 13

Mean Developmental Gain in Months Using Compensated Scores For the Six Measures and Non-Compensated Scores for IQ (N = 18)

Measurement	Statistic	*Sex F	*Sex M
A-B Physical	$\bar{X}$	-15.9	12.4
	SD	30.9	33.7
A-B Self-Help	$\bar{X}$	39.0	.1
	SD	46.3	19.6
A-B Social	$\bar{X}$	-19.9	-2.1
	SD	29.0	20.6
A-B Academic	$\bar{X}$	21.2	1.7
	SD	20.2	22.6
A-B Communication	$\bar{X}$	- 6.0	- 6.5
	SD	31.6	22.8
Binet/Cattell IQ	$\bar{X}$	-34.4	-27.7
	SD	18.0	27.5
Binet/Cattell MA	$\bar{X}$	-21.2	-14.2
	SD	13.2	18.8

*N=18 (7F and 11M)

Table 14

Analysis of Variance Between Sexes Using Compensated Scores for Six Measures and Non-Compensated Scores for IQ (N = 18)

Measurement	Univariate F	df	Probability
A-B Physical	3.22	1,16	.09
A-B Self-Help	6.27	1,16	.02
A-B Social	2.33	1,16	.15
A-B Academic	4.74	1,16	.05
A-B Communication	.002	1,16	.97
S-B/Cattell IQ	.33	1,16	.58
S-B/Cattell MA	.72	1,16	.41

Hypothesis 3

In the third hypothesis a comparison is made of the progress by the one year intervention group (N = 14) with the progress made by the two year intervention group (N = 18) during both the first year of intervention and for the complete two year period. Table 15 presents the mean gains in months by groups (N = 14 and N = 18) and sex for the six measures in compensated scores and for intelligence in non-compensated scores during the first year of the program.

Table 15

Mean Gains and Standard Deviation in Months by Groups (1 = 14 and 2 = 18) and Sex for Seven Measures During First Program Year

Sex	Statistic	Measurement: A-B Physical		A-B Self-Help		A-B Social		A-B Academic		A-B Communication		Binet/Cattell IQ		Binet/Cattell MA	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
F	$\bar{X}$	5.8	8.8	5.6	5.5	-1.0	7.0	10.8	8.6	-1.3	8.1	13.1	12.0	4.7	6.0
	SD	8.1	11.1	10.8	15.0	9.2	8.0	10.6	3.6	9.4	4.2	11.3	8.6	5.9	7.6
M	$\bar{X}$	2.0	-1.8	10.4	0.0	4.3	0.7	2.6	5.2	4.7	7.7	7.9	16.3	5.8	5.7
	SD	10.5	9.9	16.1	19.0	8.5	12.8	4.7	6.6	6.5	7.2	19.1	17.4	5.2	8.4

Best scan available based on pages available. Lighter printed texts may not be readable.

Table 16 presents the comparison between the one year intervention group (N = 14) with the first year progress of the two year intervention group (N = 18). The multivariate interaction is not significant, F (7, 22) = 2.35, $p < .06$. Neither the multivariate main effect for the group, F (7, 22) = .57, $p < .77$, nor for Sex, F (7, 22) = 1.44, $p < .24$ is significant. For interaction, the univariate for Alpern-Boll Communication is significant, F (1, 28) = 6.88, $p < .01$. For sex, the univariate for the Alpern-Boll Physical, F (1, 28) = 4.47, $p < .04$, and for the Alpern-Boll Academic, F (1, 28) = 5.09, $p < .03$, is significant.

These data do not permit rejection of the null hypothesis and thus permit the conclusion that both the groups and the sexes performed equally well during the first year of intervention.

In Table 17, the basic data are presented for the progress made by the N = 14 group and the N = 18 group during the time in the program. The multivariate interaction is not significant, F (7, 22) = 1.49, $p < .22$. The univariate for the Alpern-Boll Social which is presented in Table 18 is significant, F (1, 28) = 4.43, $p < .05$. Neither the multivariate main effect for groups, F (7, 22) = .83, $p < .57$, nor for Sex, F (7, 22) = 1.51, $p < .22$, was significant. For sex, the univariate as shown in Table 18 for the Alpern-Boll Academic is significant, F (1, 28) = 6.54, $p < .02$.

Table 16

Analysis of Variance Between One Year of Intervention (N = 14) and First Year of Two Year Intervention Group (N = 18) Using Compensated Scores for the Six Measures and Non-Compensated Scores for IQ

Measurement	Analysis	Univariate F	df	p
A-B Physical	Group	.21	1,28	.65
	Sex	4.47	1,28	.04
	Interaction	.88	1,28	.36
A-B Self-Help	Group	1.06	1,28	.31
	Sex	.02	1,28	.89
	Interaction	.79	1,28	.38
A-B Social	Group	.17	1,28	.68
	Sex	.09	1,28	.76
	Interaction	2.50	1,28	.13
A-B Academic	Group	.01	1,28	.94
	Sex	5.09	1,28	.03
	Interaction	.94	1,28	.34
A-B Communi-cation	Group	.56	1,28	.46
	Sex	.30	1,28	.59
	Interaction	6.88	1,28	.01
S-B/Cattell IQ	Group	.58	1,28	.45
	Sex	.00	1,28	1.00
	Interaction	.77	1,28	.39
S-B/Cattell MA	Group	.05	1,28	.83
	Sex	.02	1,28	.89
	Interaction	.08	1,28	.79

Table 17

Mean Gains and Standard Deviations in Months by Groups (1 = 14 and 2 = 18) and Sex for Seven Measures During Total In-Program Time for Each Group

Sex	Statistic	Measurement													
		A-B Physical		A-B Self-Help		A-B Social		$\bar{A}$-$\bar{B}$ Academic		A-B Commun-ication		Binet/ Cattell IQ		Binet/ Cattell MA	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
F	$\bar{X}$	5.8	13.2	5.6	20.3	-1.0	14.1	10.8	14.3	-1.3	12.1	13.1	21.0	4.7	12.0
	SD	8.1	27.2	10.8	32.8	9.2	15.7	10.6	11.4	9.4	12.0	11.3	15.0	6.0	12.5
M	$\bar{X}$	2.0	-6.0	10.4	-0.9	4.3	0.3	2.6	2.0	4.7	2.1	7.9	19.1	5.8	8.1
	SD	10.6	21.8	16.1	22.8	8.5	14.3	4.7	14.3	6.5	17.3	19.1	17.7	5.2	10.2

Best scan available based on pages available. Lighter printed texts may not be readable.

Table 18

Analysis of Variance Between Total In-Program Time (N = 14 and N = 18) Using Compensated Scores for the Six Measures and Non-Compensated Scores for IQ

Measurement	Analysis	Univariate F	df	p
A-B Physical	Group	.13	1,28	.73
	Sex	3.23	1,28	.08
	Interaction	1.25	1,28	.27
A-B Self-Help	Group	.01	1,28	.94
	Sex	1.41	1,28	.25
	Interaction	2.62	1,28	.12
A-B Social	Group	.82	1,28	.37
	Sex	1.32	1,28	.26
	Interaction	4.43	1,28	.05
A-B Academic	Group	.0004	1,28	.98
	Sex	6.54	1,28	.02
	Interaction	.24	1,28	.63
A-B Communi-cation	Group	.87	1,28	.36
	Sex	.38	1,28	.54
	Interaction	2.98	1,28	.10
S-B/Cattell IQ	Group	2.58	1,28	.12
	Sex	.34	1,28	.56
	Interaction	.08	1,28	.78
S-B/Cattell MA	Group	1.83	1,28	.19
	Sex	.26	1,28	.62
	Interaction	.59	1,28	.45

The analysis of this hypothesis three does not permit rejection of the null. Thus, since the use of age compensated scores permitted comparison over two different time periods, the conclusion may be drawn that the rate of improvement in the one year group and the two year group was relatively constant for the groups, the sexes, and for the tests.

Hypothesis 4

The fourth hypothesis compared the progress made by the two year intervention group (N = 18) with that made by the one year intervention group (N = 14) during the two years subsequent to intervention. Age compensated values were used on the five measures of the Alpern-Boll and on mental age. Intelligence was not treated with the age compensated formula. Table 19 shows the basic data for the mean gains and standard deviations in months by groups and sex for the seven measures during the two year follow-up.

The multivariate interaction is not significant, F (7, 22) = 1.22, $p < .33$. Neither the multivariate main affect for group, F (7, 22) = 1.70, $p < .16$, nor for Sex, F (7, 22) = 1.11, $p < .39$, is significant. Table 20 presents the univariate F-ratio by group, sex, and interaction of tests. For the groups, the univariate for the Stanford-Binet/Cattell intelligence, F (1, 28) = 7.63, $p < .01$, and for the Stanford-Binet/Cattell mental age, F (1, 28) = 7.51, $p < .01$, was significant.

Table 19

Mean Gains and Standard Deviations in Months by Groups (1 = 14 and 2 = 18) and Sex for Seven Measures During Two Year Follow-up

Sex	Statistic	Measurement													
		A-B Physical		A-B Self-Help		A-B Social		A-B Academic		A-B Commun-ication		Binet/ Cattell IQ		Binet/ Cattell MA	
		1	2	1	2	1	2	1	2	1	2	1	2	1	2
F	$\bar{X}$	6.3	-2.7	0.5	-18.6	8.4	-5,7	-2.0	-6.9	8.2	6.1	4.9	-13.4	3.7	-9.2
	SD	19.7	9.9	29.4	21.9	23.0	17.6	14.4	10.4	13.3	22.6	14.6	10.0	7.8	7.6
M	$\bar{X}$	1.5	6.4	-4.8	-0.8	6.6	-1.8	2.6	3.8	5.9	-4.5	3.7	-8.6	4.4	-6.1
	SD	29.1	18.9	25.7	19.7	20.3	15.5	10.6	12.9	22.1	12.2	18.3	15.6	14.6	13.5

Best scan available based on pages available. Lighter printed texts may not be readable.

Table 20

Analysis of Variance Between the One Year (N = 14) and Two Year (N = 18) Groups on Follow-up Gains Two Years Subsequent to Intervention Using Compensated Scores for Six Measures and Non-Compensated Scores for IQ

Measurement	Analysis	Univariate F	df	p
A-B Physical	Group	.02	1,28	.89
	Sex	.15	1,28	.70
	Interaction	.90	1,28	.35
A-B Self-Help	Group	.43	1,28	.52
	Sex	.76	1,28	.39
	Interaction	1.82	1,28	.19
A-B Social	Group	2.58	1,28	.12
	Sex	.04	1,28	.84
	Interaction	.18	1,28	.68
A-B Academic	Group	.03	1,28	.87
	Sex	3.20	1,28	.09
	Interaction	.48	1,28	.50
A-B Communi-cation	Group	1.42	1,28	.24
	Sex	1.20	1,28	.28
	Interaction	.44	1,28	.51
S-B/Cattell IQ	Group	7.63	1,28	.01
	Sex	.16	1,28	.70
	Interaction	.30	1,28	.59
S-B/Cattell MA	Group	7.51	1,28	.01
	Sex	.22	1,28	.64
	Interaction	.08	1,28	.78

The data for the fourth hypothesis do not permit rejection of the null hypothesis. The conclusion may be drawn, therefore, that the rate of progress made during the two year follow-up period is essentially the same for the two groups, irrespective of whether they had one or two years in the program.

Hypothesis 5

Since the fifth hypothesis could not be treated statistically a descriptive analysis was conducted. The descriptive analysis of the N = 43 related to the comparison of the identified category of handicapping condition upon entrance into the program with the subsequent educational placement. Table 21 presents the chronological age data for the 43 subjects with descriptive analysis. The mean CA for the N = 43 was 41.2 months, with maximal and minimal ages of 68.9 and 5.3 months. The mean exit CA was 52.5 months with maximal and minimal ages of 79.4 and 22.4 months.

Of the total group of 43 there were 19 females with a mean entrance CA of 42.3 months and maximal and minimal ages of 63.4 and 5.3 months. The mean exit CA for the females was 53.6 months with maximal and minimal ages of 79.4 and 22.4 months. For the group of 43 subjects 24 were males with a mean entrance CA of 40.5 months, with maximal and minimal ages of 68.9 and 10.3 months. The mean exit CA for the males was 51.6 months, with maximal and minimal ages of 76.5 and 27.8 months.

Table 21

Chronological Age Data in Months on Children with Subsequent Educational Placement Data (N = 43)

Measurements	Subjects		Statistics Range		
	Sex	N	Mean	Upper	Lower
Entrance	F	19	42.3	63.4	5.3
	M	24	40.5	68.9	10.3
	F + M	43	41.2	68.9	5.3
Exit	F	19	53.5	79.4	22.4
	M	24	51.6	76.5	27.8
	F + M	43	52.5	79.4	22.4

The five identified categories of handicapping conditions upon program entrance were: language deficit, mentally retarded, physically handicapped, blind or visually impaired, and behaviorally disordered. This study compared the original category with subsequent regluar or special education placement. Of the total group of 43 subjects 20 (47%) were identified as having language deficits; 13 (30%) were mentally retarded, 4 (9%) were physically handicapped, 3 (7%) were blind or visually impaired, and 3 (7%) were behaviorally disordered.

Of the original 43 subjects, there were 19 females and 24 males in the PEECH program. In the follow-up study for

subsequent educational placement 28 subjects (65%) were in regular educational placement while 15 subjects (35%) remained in special education. Of the 28 in regular education 10 were females and 18 were male with 8 females and 7 males remaining in special education.

Table 22 presents the subsequent educational placement information.

Table 22

Subsequent Educational Placement
Based on Category of Handicapping Condition
Upon Entrance to the Program

Placement	Language Deficit	Mentally Retarded	Physically Handicapped	Blind	Behav. Disord.
Regular	18	2	3	3	2
Special Education	2	11	1	0	1
Total	20	13	4	3	3

These data are supportive of the assumption that programs for young handicapped children does make a meaningful difference in future educational placements.

Chapter 5

Summary, Conclusions, and Discussion

The purpose of this study was to determine the long term effects of an early intervention program (PEECH) with respect to the gains made during one and two years of intervention versus the gains made following intervention in relationship to self-help skills, social skills, physical skills, communication skills, academic skills, intelligence, and mental age; and the relationship of the category of handicapping condition to the subsequent educational placement. This investigation was concerned with research which will support the evidence of effectiveness of educational programs for young handicapped children and their families.

Limited research investigations have been conducted on a longitudinal basis for handicapped children. There has been an escalation in the rate of establishing public and legislative demands on the schools to provide educational programs for the handicapped in the past 15 years. Literature cites programs providing services to the young handicapped child and the family. The federal and state legislative mandates, and support through the federal and state funding for programs demonstrates the change in attitude toward the potential of the handicapped child.

Restraints of the Research

The conclusions and generalizations from this study were limited by the following:

1. This study was confined to the PEECH participants still living within the Region IX Education Service Center area which includes twelve north central Texas counties.

2. The research population was limited to 43 PEECH subjects with follow-up data one, two, and three years subsequent to program participation.

3. The experimental procedure involved 32 of the 43 PEECH subjects with one and two years program participation and followup data two years subsequent to program participation.

Procedures

The 1972-75 Project PEECH participants were selected for this study. Inasmuch as no control was used, the analysis of the longitudinal data included 43 of the original 99 program participants. The follow-up studies of the 32 children living in the geographical area covered by the program determined whether the gains were maintained following termination of the intervention program. A descriptive study of the 43 children determined the relationship of the identified handicapping condition upon program entrance with the subsequent educational placement.

The three instruments employed for data collection were the Alpern-Boll Developmental Profile and the Stanford-Binet

Intelligence Scale or the Cattell Infant Intelligence Scale. These tests were administered independently during each program year (September and May) and each spring (May) following termination of the program (1975) through May, 1978. The data collected from the Alpern-Boll Developmental Profile reveals developmental skill ages in: self-help skills, social skills, physical skills, communication skills, and academic skills. The Stanford-Binet Intelligence Scale or the Cattell Infant Intelligence Scale provides a mental age and an intelligence quotient. The developmental skills ages and mental age are recorded in months.

Age compensated scores (Irwin and Wong, 1974) were used. In this technique, the assumption is made that the rate of development manifested by each subject in each domain will remain constant during the intervention period. The compensated post-value, then, is the difference between the projected post-value and the actual post-value. The compensated post-value is, in short, a mathematical correction for maturation.

An analysis of the relationship of the pre-handicapping condition and subsequent educational placement was made. The category of handicapping condition related to the five areas served: language delayed, mentally retarded, physically handicapped, blind or visually impaired, and behaviorally disordered. The subsequent educational placement was

examined and categorized as regular classroom or special education placement.

Results

The first null hypothesis investigated the gains made during one year of intervention (N = 14) with the gains made two years subsequent to intervention. Age compensated scores (Irwin and Wong, 1974) were used. In a one sample F-test of the total group, the multivariate analysis was not significant, F (7, 7) = 1.03, $p < .49$. This analysis of the group of 14 suggests that the rate of progress established while in the program is maintained subsequent to exit from the program, thus the first hypothesis cannot be rejected.

In the study of the second hypothesis the gains made during two years of intervention (N = 18) were compared with the progress made during the two years subsequent to intervention. In applying the one sample F-test, the multivariate test was significant, F (7, 11) = 3.85, $p < .02$. These data suggest that the gains made while in the program were greater than those made in follow-up, thus, permitting rejection of the second hypothesis.

The third hypothesis compared the progress made by the one year intervention group (N = 14) with the progress made by the two year intervention group (N = 18) during both the first year of intervention and for the complete two year period. The multivariate interaction was not significant,

F (7, 22) = 1.49, $p < .22$. The multivariate analysis on main effect for groups, F (7, 22) = .83, $p < .57$, was not significant. Since there was no significant difference between the two groups during the different time periods of program participation, a comparison was made of the first program year of group 2 (N = 18) and of the one program year of group 1 (N = 14). The multivariate interaction in the comparison of the one year with the first year of the two year program group was not significant, F (7, 22) = 2.35, $p < .06$. For main effects, the multivariate analysis for groups, F (7, 22) = .57, $p < .77$, was not significant. These data permit the conclusion that the groups performed equally well during the first year of intervention. These analyses do not permit rejection of the third hypothesis. Thus, since the use of age compensated scores permitted comparison over two different time periods, the conclusion may be drawn that the rate of improvement in the one year group was relatively constant for the groups and for the tests.

The fourth hypothesis compared the progress made by the one year intervention group (N = 14) with that made by the two year group (N = 18) during the two years subsequent to intervention. The multivariate interaction was not significant, F (7, 22) = 1.22, $p < .33$ and the multivariate analysis on main affect for groups, F (7, 22) = 1.70, $p < .16$, was not significant. These data do not permit rejection of the null hypothesis.

The conclusion may be drawn, therefore, that the rate of progress made during the two year follow-up period is essentially the same for the two groups irrespective of whether they had one or two years in the program.

Although sex was not a variable included in the hypotheses it was a part of the analyses conducted. In a comparative study of sex on the N = 14 in the first hypothesis and on the N = 18 in the second hypothesis the data indicate no significant differences between the gains made by sex. These analyses permit the conclusion that male and female participants performed equally well during intervention as well as in the follow-up studies.

The descriptive study conducted for the fifth hypothesis revealed that the identification of the handicapping condition upon entrance to the program at a young age does not necessarily constitute the projected educational placement; however, a larger percentage of the mentally retarded remained in special education while a larger percentage of the children with language defects, vision impairments, physical handicaps, and behavioral problems were, in fact, in regular education placement subsequent to intervention. Therefore, the fifth hypothesis was rejected.

Conclusions

In conclusion, this research provides evidence that the PEECH Program has been an educationally viable model for

providing educational services to young handicapped children and their parents. This study has provided the data which support the effectiveness of the model program through a comparison of gains made by participants while in the program with the gains made subsequent to intervention. Some implications derived from this study are as follows:

1. Parents can be trained to effectively work with their own handicapped child.
2. Parents can serve as effective paraprofessional educators.
3. Home intervention is an effective method for delivering services to young handicapped children.
4. Home intervention is an economically sound approach to serving handicapped children in rural, sparsely settled areas.
5. Children demonstrate greater gains while in a structured program.
6. The gains made by children during a one and two year period of intervention are similar.
7. Boys do not demonstrate greater gains than girls; therefore, sex is not a determining factor in the rate of gains made.
8. Categorical placement at an early age will not necessarily constitute educational placement, especially in the case of the mildly handicapped child.

9. Children identified as mentally retarded tend to remain in special education placement.

Recommendations for Further Research

Based on this study the following recommendations are provided.

1. Evaluation components of similar programs should contain a strong experimental research design to determine program effectiveness, thus, providing each program a system for accountability and a basis for decision making.
2. Similar studies should be undertaken to further investigate the effects of early education programs in the public schools.
3. An investigation should be conducted to determine the appropriateness of the articulation between special compensatory programs and subsequent educational program arrangements.
4. Comparison of categorial handicapping conditions with educational placement should be maintained in early childhood programs to determine the impact of labeling.
5. Further studies should be made concerning the impact of parent training on subsequent performance of young children.

APPENDIX A

Education Service Center
region IX

PROGRAM PARTICIPATION AND EVALUATION FORM

REGION IX EDUCATION SERVICE CENTER
Project PEECH

I, _____, give my permission for _____ to be considered as a participant in the Program for Early Education of Children with Handicaps.

I understand that this will include evaluation of the handicapping conditions and a home training program.

I realize that the success of the program with _____ _____ will depend upon my full cooperation with the teacher visits and my day to day total involvement.

No medical service or compensation is provided to subjects by the University as a result of injury from participation in research.

Signed,

_____
Parent or Guardian

_____
Address

_____
Phone Number

_____
Date

Education Service Center
region IX

PERMISSION FOR FOLLOW-UP EVALUATION

REGION IX EDUCATION SERVICE CENTER
Project PEECH

I, _____, give my permission for re-evaluation of _____ to be used in a follow-up evaluation of children involved in the Program for Early Education of Children with Handicaps. This information will be kept confidential.

No medical service or compensation is provided to subjects by the University as a result of injury from participation in research.

Signed,

_____
Parent or Guardian

_____
Address

_____
Phone Number

_____
Date

APPENDIX B

Table A

Basic Summary by Test for 98 Subjects

Using Original Entrance and Final Exit Scores

Test	Specification	Mean	Standard Deviation	Std. Error of Mean	Minimum	Maximum	Range	F-Ratio	Probability
	Pre	36.50	19.689	1.989	3.00	94.00	91.00		
A-B	Post	51.56	22.182	2.241	6.00	102.00	96.00		
Physical	Pre - Post	15.1	14.4					106.64	.001
Age	Comp. Post	42.24	21.743	2.196	-6.72	89.09	95.81		
	Comp. Post - Pre	5.7	16.4					12.02	.001
	Pre	41.93	23.787	2.403	.00	94.00	94.00		
A-B	Post	58.92	23.319	2.356	6.00	102.00	96.00		
Self-	Post - Pre	17.0	16.4					104.92	.001
Help	Comp. Post	48.74	21.547	2.177	4.88	97.50	92.62		
	Comp. Post - Pre	6.8	17.8					14.33	.001
	Pre	38.35	18.210	1.840	4.00	82.00	78.00		
A-B	Post	53.11	20.852	2.106	6.00	102.00	96.00		
Social	Post - Pre	14.8	12.9					128.63	.001
	Comp. Post	43.54	19.619	1.982	1.28	97.23	95.94		
	Comp. Post - Pre	5.2	12.3					17.45	.001
	Pre	32.14	15.835	1.600	2.00	78.00	76.00		
A-B	Post	48.09	18.541	1.873	6.00	86.00	80.00		
Academic	Post - Pre	15.9	10.8					214.27	.001
	Comp. Post	40.29	18.363	1.855	1.96	80.84	78.88		
	Comp. Post - Pre	8.1	10.9					54.86	.001
	Pre	31.05	15.593	1.575	2.00	70.00	68.00		
A-B	Post	44.96	18.111	1.830	8.00	96.00	88.00		
Communi-	Post - Pre	13.9	10.5					170.70	.001
cation	Comp. Post	37.24	17.696	1.788	-6.72	91.37	98.09		
	Comp. Post - Pre	6.2	11.1					30.46	.001
	Pre	32.98	17.278	1.745	2.00	87.00	85.00		
S-B/Cattell	Post	49.79	19.464	1.966	4.00	113.00	109.00		
Intelli-	Post - Pre	16.8	13.0					163.60	.001
gence	Comp. Post	41.66	18.758	1.895	1.28	99.19	97.91		
	Comp. Post - Pre	8.7	12.7					45.78	.001

Table B

Master List for 98 Participants

for Program Participation

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Studies Made in the Spring 76	77	78
001*		X	X	X	X	X
002*		X	X	X	X	X
004		X	X			
006		X				
008*		X		X		X
009*		X	X	X	X	X
010*		X			X	X
011*		X	X		X	X
012			X			
013		X	X			
014	X	X				
015	X	X				
016		X				
017	X	X				
019		X	X			
020		X				
023	X	X				
024		X				
026*	X	X	X	X		
027*	X	X		X	X	
028		X				
029		X				
030*		X	X	X	X	X
031		X	X			
032		X	X			
033*		X	X	X	X	X
034*		X	X		X	X
035			X			
036		X				
038*		X			X	X

Table B, Continued

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Studies Made in the Spring 76	77	78
039		X				
040*		X			X	
041	X	X				
042		X	X			
043		X				
045*	X	X	X	X	X	X
046	X	X				
047		X	X			
048*		X	X	X	X	X
049		X				
050*		X	X	X	X	
053		X				
055*		X		X		
056*		X	X	X	X	X
057*	X	X		X		X
058*	X	X		X		X
059*		X	X	X	X	X
060		X				
061*		X		X	X	X
062	X	X				
068*		X	X	X	X	X
069		X				
070		X				
072*		X	X	X		
101			X			
102*			X	X	X	X
103*			X	X	X	X
104			X			
105			X			
106*			X	X	X	X

Table B, Continued

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Studies Made in the Spring 76	77	78
107*			X	X		
108*			X	X		
109			X			
110			X			
112			X			
117			X			
118*			X	X	X	
119			X			
121*			X	X		X
122*			X	X		
123*			X	X		
127			X			
129			X			
132*			X		X	X
133*			X	X		
134			X			
135*			X	X		
136			X			
137			X			
138			X			
140			X			
141*			X	X	X	X
142			X			
143*			X	X	X	X
146			X			
147			X			
148*			X	X		
160*			X	X	X	X
161*			X	X	X	X
167*			X	X	X	

Table B, Continued

Identification Code	Intervention Program Pre/Post 72-73	Pre/Post 73-74	Pre/Post 74-75	Follow-up Studies Made in the Spring 76	77	78
172*			X	X	X	X
174			X			
721	X					
722	X					
725	X					
727	X					
730	X					
731	X					
732	X					

*Participants in follow-up studies
Data on 167 not included in the study of 98 participants.

Table C

Comparison in Months Using Non-Compensated Means

For Followup Group (N = 32) and Remaining PEECH Subjects (N = 52)

on Seven Measures at Entrance and at End of First Program Year

Time Base	Statistic	Measure											
		A-B Physical			A-B Self-Help			A-B Social			A-B Academic		
	No.	52	32	52 Minus 32	52	32	52 Minus 32	52	32	52 Minus 32	52	32	52 Minus 32
Pre	$\bar{X}$	35.9	35.6	0.3	42.8	39.9	2.9	38.8	37.9	.9	34.1	30.4	3.7
	SD	19.7	22.0		24.5	25.1		18.7	19.0		17.8	13.6	
Post	$\bar{X}$	49.9	45.4	4.5	56.2	52.0	4.2	50.1	47.4	2.7	47.4	42.7	4.6
	SD	23.3	21.0		25.0	21.6		22.7	18.3		20.7	17.4	
Dif.	$\bar{X}$	14.0	9.8	4.2	13.4	12.1	1.3	11.3	9.5	1.8	13.2	12.2	1.0
	SD	14.3	8.7		14.8	14.2		12.3	9.0		10.8	7.1	

Time Base	Statistic	Measure								
		A-B Communication			A-B Binet/Cattell IQ			A-B Binet/Cattell MA		
	No.	52	32	52 Minus 32	52	32	52 Minus 32	52	32	52 Minus 32
Pre	$\bar{X}$	31.6	31.7	-.1	69.0	74.9	-5.9	35.0	30.9	4.1
	SD	16.1	16.8		26.5	19.6		19.4	14.7	
Post	$\bar{X}$	43.9	40.3	3.6	86.3	79.4	-6.9	48.1	41.4	6.7
		20.1	17.5		28.8	28.1		21.1	17.5	
Dif.	$\bar{X}$	12.3	8.6	3.7	14.3	4.4	9.9	13.1	10.5	2.6
		9.4	6.6		15.7	28.7		9.6	6.2	

APPENDIX C

Table D

Analysis of Variance of the Seven Measures in the Comparison of the N = 52 and N = 32

Measurement	Time Base	Univariate F	df	Probability
A-B Physical	Entrance	.004	1,82	.95
	Exit	.770	1,82	.38
	Difference	2.202	1,82	.14
A-B Self-Help	Entrance	.285	1,82	.60
	Exit	.630	1,82	.43
	Difference	.149	1,82	.70
A-B Social	Entrance	.046	1,82	.83
	Exit	.317	1,82	.58
	Difference	.494	1,82	.48
A-B Academic	Entrance	.979	1,82	.33
	Exit	1.123	1,82	.29
	Difference	.220	1,82	.64
A-B Communi-cation	Entrance	.001	1,82	.98
	Exit	.716	1,82	.40
	Difference	3.779	1,82	.06
S-B/Cattell IQ	Entrance	1.199	1,82	.28
	Exit	1.153	1,82	.29
	Difference	7.011	1,82	.01
S-B/Cattell MA	Entrance	1.088	1,82	.30
	Exit	2.299	1,82	.13
	Difference	1.878	1,82	.17

APPENDIX D

Table E

Mean Developmental Change in Months for 14 Subjects by 7 Tests in Non-Compensated and Compensated Units for Two Year Follow-Up Gains and One Year Program Gains

Measurement	Statistic	Noncompensated	Compensated
A-B Physical	$\bar{X}$	18.1	-.0
	SD	23.5	24.6
A-B Self-Help	$\bar{X}$	11.1	-10.2
	SD	31.1	35.4
A-B Social	$\bar{X}$	23.7	5.8
	SD	21.3	22.0
A-B Academic	$\bar{X}$	10.7	-6.4
	SD	16.5	19.6
A-B Communication	$\bar{X}$	20.9	5.4
	SD	18.3	19.5
Stanford-Binet/ Cattell IQ	$\bar{X}$	-6.2	-6.2
	SD	23.1	23.1
Stanford-Binet/ Cattell MA	$\bar{X}$	14.9	-1.2
	SD	11.8	12.7

Table F

Analysis of Variance Between the Two Year Follow-up Program Gains and the One Year Program Gains (N = 14) Using Compensated and Non-Compensated Units

Measurement	Analysis	Univariate F	df	Probability
A-B Physical	Non-Comp.	8.33	1,13	.01
	Compensated	.000	1,13	.99
A-B Self-Help	Non-Comp.	1.80	1,13	.20
	Compensated	1.16	1,13	.30
A-B Social	Non-Comp.	17.32	1,13	.001
	Compensated	.99	1,13	.34
A-B Academic	Non-Comp.	5.94	1,13	.03
	Compensated	1.48	1,13	.25
A-B Communi-cation	Non-Comp.	18.27	1,13	.001
	Compensated	1.07	1,13	.32
S-B/Cattell IQ	Non-Comp.	1.02	1,13	.33
	Compensated	1.02	1,13	.33
S-B/Cattell MA	Non-Comp.	22.57	1,13	.0004
	Compensated	.12	1,13	.74

Table G

Mean Developmental Gain in Months by Sex for Two Year Follow-Up and One Year Program Gains Using Non-Compensated and Compensated Scores (F = 7 and M = 7)

Measurement	Analysis	Statistic	Sex F	Sex M
A-B Physical	Noncomp.	$\bar{X}$	18.9	17.4
		SD	20.5	27.9
	Comp.	$\bar{X}$	.5	-.5
		SD	21.6	29.0
A-B Self-Help	Noncomp.	$\bar{X}$	16.3	6.0
		SD	27.3	35.9
	Comp.	$\bar{X}$	-5.1	-15.3
		SD	33.9	38.9
A-B Social	Noncomp.	$\bar{X}$	28.0	19.4
		SD	21.1	22.3
	Comp.	$\bar{X}$	9.4	2.3
		SD	22.8	22.3
A-B Academic	Noncomp.	$\bar{X}$	6.9	14.6
		SD	20.6	11.3
	Comp.	$\bar{X}$	-12.7	-.0
		SD	23.7	13.3
A-B Commun-	Noncomp.	$\bar{X}$	25.1	16.6
		SD	17.4	19.4
	Comp.	$\bar{X}$	9.5	1.3
		SD	19.4	20.3
Binet/Cattell IQ	Noncomp.	$\bar{X}$	-8.3	-4.1
		SD	17.6	28.6
	Comp.	$\bar{X}$	-8.3	-4.1
		SD	17.6	28.9
Binet/Cattell MA	Noncomp.	$\bar{X}$	16.4	13.4
		SD	9.1	14.5
	Comp.	$\bar{X}$	-.9	-1.4
		SD	9.9	15.8

Table H

Analysis of Variance Between Sexes Using Compensated Scores for the Six Measures and Non-Compensated Scores for IQ (F = 7 and M = 7)

Measurement	Analysis	Univariate F	df	Probability
A-B Physical	Non-Comp.	.0119	1,12	.92
	Compensated	.0047	1,12	.95
A-B Self-Help	Non-Comp.	.3641	1,12	.56
	Compensated	.2698	1,12	.61
A-B Social	Non-Comp.	.5458	1,12	.47
	Compensated	.3467	1,12	.57
A-B Academic	Non-Comp.	.7554	1,12	.40
	Compensated	1.5303	1,12	.24
A-B Communi-cation	Non-Comp.	.7569	1,12	.40
	Compensated	.6013	1,12	.45
S-B/Cattell IQ	Non-Comp.	.1052	1,12	.75
	Compensated	.1052	1,12	.75
S-B/Cattell MA	Non-Comp.	.2141	1,12	.65
	Compensated	.0049	1,12	.94

Table I

Mean Developmental Change in Months for 18 Subjects by 7 Tests Using Non-Compensated and Compensated Units for Two Year Follow-up Gains and Two Year Program Gains

Measurement	Statistic	Noncompensated	Compensated
A-B Physical	$\bar{X}$	6.6	1.4
	SD	27.9	34.7
A-B Self-Help	$\bar{X}$	-5.3	-15.1
	SD	29.3	36.9
A-B Social	$\bar{X}$	-.9	-9.0
	SD	20.6	25.0
A-B Academic	$\bar{X}$	-.1	-7.2
	SD	19.5	24.0
A-B Communication	$\bar{X}$	1.0	-6.3
	SD	21.1	25.7
Stanford-Binet/ Cattell IQ	$\bar{X}$	-30.33	-30.33
	SD	23.84	23.84
Stanford-Binet/ Cattell MA	$\bar{X}$	-8.7	-16.9
		14.3	16.8

Table J

Analysis of Variance Between
the Two Year Follow-up Program Gains and the
Two Year Program Gains (N = 18)
Using Compensated and Non-Compensated Units

Measurement	Analysis	Univariate F	df	Probability
A-B Physical	Non-Comp.	1.01	1,17	.33
	Compensated	.03	1,17	.87
A-B Self-Help	Non-Comp.	.60	1,17	.45
	Compensated	2.99	1,17	.10
A-B Social	Non-Comp.	.03	1,17	.86
	Compensated	2.33	1,17	.15
A-B Academic	Non-Comp.	.0006	1,17	.98
	Compensated	1.61	1,17	.22
A-B Communi-cation	Non-Comp.	.04	1,17	.84
	Compensated	1.09	1,17	.31
S-B/Cattell IQ	Non-Comp.	29.15	1,17	.0001
	Compensated	29.15	1,17	.0001
S-B/Cattell MA	Non-Comp.	6.60	1,17	.02
	Compensated	18.29	1,17	.0006

Table K

Mean Developmental Gain in Months by Sex for Two Year Follow-up Gains and Two Year Program Gains Using Non-Compensated and Compensated Values (F = 7 and M = 11)

Measurement	Analysis	Statistic	Sex F	Sex M
A-B Physical	Noncomp.	$\bar{X}$	-6.7	15.1
		SD	24.2	27.8
	Comp.	$\bar{X}$	-15.9	12.4
		SD	30.9	33.7
A-B Self-Help	Noncomp.	$\bar{X}$	-24.6	6.9
		SD	35.5	16.7
	Comp.	$\bar{X}$	39.0	.1
		SD	46.3	19.6
A-B Social	Noncomp.	$\bar{X}$	-8.9	4.2
		SD	23.4	17.8
	Comp.	$\bar{X}$	-19.9	-2.1
		SD	29.0	20.6
A-B Academic	Noncomp.	$\bar{X}$	-11.3	7.0
		SD	15.6	19.0
	Comp.	$\bar{X}$	-21.2	1.7
		SD	20.2	22.6
A-B Communication	Noncomp.	$\bar{X}$	2.9	-.2
		SD	26.7	18.0
	Comp.	$\bar{X}$	-6.0	-6.5
		SD	31.6	22.8
Binet/Cattell IQ	Noncomp.	$\bar{X}$	-34.4	-27.7
		SD	18.0	27.5
	Comp.	$\bar{X}$	-34.4	-27.7
		SD	18.0	27.5
Binet/Cattell MA	Noncomp.	$\bar{X}$	-13.0	-5.9
		SD	10.6	16.1
	Comp.	$\bar{X}$	-21.2	-14.2
		SD	13.2	18.8

Table L

Analysis of Variance Between

Sexes Using Compensated and Non-Compensated Units

(F = 7 and M = 11)

Measurement	Analysis	Univariate F	df	Probability
A-B Physical	Non-Comp.	2.90	1,16	.11
	Compensated	3.22	1,16	.09
A-B Self-Help	Non-Comp.	6.56	1,16	.02
	Compensated	6.27	1,16	.02
A-B Social	Non-Comp.	1.80	1,16	.20
	Compensated	2.33	1,16	.15
A-B Academic	Non-Comp.	4.52	1,16	.05
	Compensated	4.74	1,16	.05
A-B Communi-cation	Non-Comp.	.08	1,16	.78
	Compensated	.002	1,16	.97
S-B/Cattell IQ	Non-Comp.	.33	1,16	.58
	Compensated	.33	1,16	.58
S-B/Cattell MA	Non-Comp.	1.05	1,16	.32
	Compensated	.72	1,16	.41

Table M

Analysis of Variance for One Year of Program Gains (N = 14) versus the First Year of Two Year Program Gains (N = 18) Using Compensated and Non-Compensated Units

Measurement	Analysis	Univariate F	df	p
	Noncomp.	2.91	1,28	.10
	Comp.	.21	1,28	.65
A-B Physical	Sex	4.47	1,28	.04
	Interaction	.88	1,28	.37
	Noncomp.	2.79	1,28	.11
	Comp.	1.06	1,28	.31
A-B Self-Help	Sex	.02	1,28	.89
	Interaction	.79	1,28	.38
	Noncomp.	1.87	1,28	.18
	Comp.	.17	1,28	.68
A-B Social	Sex	.09	1,28	.76
	Interaction	2.50	1,28	.12
	Noncomp.	29.73	1,28	.0001
	Comp.	.01	1,28	.94
A-B Academic	Sex	5.09	1,28	.03
	Interaction	.94	1,28	.34
	Noncomp.	4.80	1,28	.04
	Comp.	.56	1,28	.46
A-B Communi-	Sex	.30	1,28	.59
cation	Interaction	6.88	1,28	.01
	Noncomp.	22.85	1,28	.0001
	Comp.	.58	1,28	.45
S-B/Cattell IQ	Sex	.00	1,28	1.00
	Interaction	.77	1,28	.39
	Noncomp.	19.31	1,28	.0002
	Comp.	.05	1,28	.83
S-B/Cattell MA	Sex	.02	1,28	.89
	Interaction	.08	1,28	.79

Table N

Analysis of Variance for One Year Program Gains (N = 14) versus the Two Year Program Gains (N = 18) Using Compensated and Non-Compensated Units

Measurement	Analysis	Univariate F	df	p
	Noncomp.	.57	1,28	.46
	Comp.	.13	1,28	.73
A-B Physical	Sex	3.23	1,28	.08
	Interaction	1.25	1,28	.27
	Noncomp.	3.77	1,28	.06
	Comp.	.01	1,28	.94
A-B Self-Help	Sex	1.41	1,28	.25
	Interaction	2.62	1,28	.12
	Noncomp.	3.09	1,28	.09
	Comp.	.82	1,28	.37
A-B Social	Sex	1.32	1,28	.26
	Interaction	4.43	1,28	.05
	Noncomp.	11.37	1,28	.002
	Comp.	.0004	1,28	.98
A-B Academic	Sex	6.54	1,28	.02
	Interaction	.24	1,28	.63
	Noncomp.	3.23	1,28	.08
	Comp.	.87	1,28	.36
A-B Communi-cation	Sex	.38	1,28	.54
	Interaction	2.98	1,28	.10
	Noncomp.	29.90	1,28	.0001
	Comp.	2.58	1,28	.12
S-B/Cattell IQ	Sex	.34	1,28	.56
	Interaction	.08	1,28	.78
	Noncomp.	22.66	1,28	.0001
	Comp.	1.83	1,28	.19
S-B/Cattell MA	Sex	.26	1,28	.62
	Interaction	.59	1,28	.45

Table O

Analysis of the Variance Between the One Year and Two Year Intervention Groups During Two Year Follow-up Using Compensated and Non-Compensated Units

Measurement	Analysis	Univariate F	df	p
	Noncomp.	.86	1,28	.36
	Comp.	.02	1,28	.89
A-B Physical	Sex	.15	1,28	.70
	Interaction	.90	1,28	.35
	Noncomp.	1.57	1,28	.22
	Comp.	.43	1,28	.52
A-B Self-Help	Sex	.76	1,28	.39
	Interaction	1.82	1,28	.19
	Noncomp.	.18	1.28	.67
	Comp.	2.58	1,28	.12
A-B Social	Sex	.04	1,28	.84
	Interaction	.18	1,28	.68
	Noncomp.	.001	1,28	.98
	Comp.	.03	1,28	.87
A-B Academic	Sex	3.20	1,28	.09
	Interaction	.48	1,28	.50
	Noncomp.	.88	1,28	.36
	Comp.	1.42	1,28	.24
A-B Communi-	Sex	1.20	1,28	.28
cation	Interaction	.44	1,28	.51
	Noncomp.	2.31	1,28	.14
	Comp.	7.63	1,28	.01
S-B/Cattell IQ	Sex	.16	1,28	.70
	Interaction	.30	1,28	.59
	Noncomp.	1.29	1,28	.27
	Comp.	7.51	1,28	.01
S-B/Cattell MA	Sex	.22	1,28	.64
	Interaction	.08	1,28	.78

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