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ABSTRACT

The Cooperative Reading Project was a 2-year study designed to test the effectiveness of three initial reading approaches and an oral language stimulation program with inner-city Southern disadvantaged children. This followup study looked for differences among the treatment groups after pupils had completed their third school year. The 354 subjects (80 percent Negro) from 12 elementary schools who were included in the followup report were divided into nine experimental treatment groups and a control group. The experimental reading treatments were the initial teaching alphabet, Words-in-Color, and a supplemented conventional reading program. The oral stimulation program used the Peabody Language Development Kits (PLDK). The effectiveness of the programs was evaluated by means of the following tests: (1) Stanford-Binet Intelligence Test, (2) Illinois Test of Psycholinguistic Abilities, (3) Torrance Tests of Creative Thinking, (4) Metropolitan Achievement Tests, (5) Written Picture Story Language Test, and (6) Oral Picture Story Language Test. Pretest, post-test, and followup-test data were analyzed. Interim and post-testing results were highly significant, especially for children who had i.t.a. with 2 or 3 years of PLDK lessons, while much of this progress was lost in followup testing. References and tables are included. (DF)

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GEORGE PEABODY COLLEGE FOR TEACHERS/NASHVILLE, TENNESSEE 37203

THE EFFECTIVENESS OF THREE READING APPROACHES AND AN ORAL LANGUAGE STIMULATION PROGRAM WITH DISADVANTAGED CHILDREN IN THE PRIMARY GRADES: A FOLLOW-UP REPORT AFTER THE THIRD GRADE

by

Lloyd M. Dunn and Robert H. Bruininks

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COOPERATIVE READING PROJECT

The Effectiveness of Three Reading Approaches and an Oral Language Stimulation Program with Disadvantaged Children in the Primary Grades: A Followup Report After the Third Grade[1]

by

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This is a followup report on our Cooperative Reading Project. This project was a two-year study designed to test the efficacy of three initial reading approaches and an oral language stimulation program with inner-city Southern disadvantaged children. An interim report was written after the first year of the project (Dunn, Neville, Bailey, Pochanart, & Pfost, 1967). A final report was prepared after the termination of the two-year experimental phase when the children had finished their second grade (Dunn, Neville, Pfost, Pochanart, & Bruininks, 1968).

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[1]The research reported herein is part of our Cooperative Reading Project supported by Grant #HD 973 from the National Institute of Child Health and Human Development, and by Ford Foundation funds through the Nashville Education Improvement Project. This experiment was carried out in collaboration with the Nashville Metropolitan Schools. Acknowledgements are extended to the many teachers and administrators who participated in this study. Special recognition is due M. D. Neely, Coordinator of Special Projects in the Nashville Metro School System, who was the main force in the school district behind the execution of this experiment.

The two earlier reports--after one year, and after two years--included the authorships of Donald Neville, Carolyn F. Bailey, Prayot Pochanart, and Philip Pfost. Dr. Neville coordinated the supplemented conventional reading program, and Dr. Bailey the words-in-color reading approach. Mr. Pochanart and Dr. Pfost were largely responsible for data collection and analyses.

This followup report provides data on the subjects when they were finishing their third grade, and one year after the experiment was completed. A complete description of the project appears in the two earlier monographs. The reader is referred back to these previous monographs for a more extensive discussion of the research design, review of the literature, measurement instruments, intervention treatments, and results. The present report is restricted largely to the results of the followup study.

The Cooperative Reading Project (CRP) was a direct outgrowth of our earlier three-year Cooperative Language Development Project (CLDP).[1] In the CLDP, the efficacy of the Initial Teaching Alphabet (ITA) for teaching beginning reading, and the lessons from the Peabody Language Development Kits for stimulating oral language, were investigated among inner-city, disadvantaged children in the Metropolitan School System of Nashville-Davidson County. In this earlier study, both the ITA and PLDK treatments were found to be quite effective (see Dunn, Pochanart, Pfost, & Bruininks, 1968). In fact, even one year after this first experiment had terminated and the children were completing their fourth grade, the ITA and PLDK treatment groups were generally more advanced than the controls, especially for the subjects who had ITA in combination with two or three years of the PLDK lessons. On the basis of these positive results, it might have been concluded that a language program using ITA plus PLDK should be incorporated into school programs for such children. However, the possibility existed that these results may have been due to a number of factors beyond the control of the project staff. Since assignment to experimental treatments was made by schools and by the

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[1] See the four relevant reports in the list of references at the end of this paper under Dunn et al., 1966, 1967, 1968, 1968.

central office staff of the school system, selection bias may have been inadvertently introduced. Moreover, the Hawthorne Effect cannot be ignored. The experimental teachers were given a number of incentives which were not available to the control teachers--including a small salary supplement, in-service training sessions, extra consultation, as well as the stimulation created by the novelty of being involved in the experimental treatments. Furthermore, frequent visits to the experimental classes were made by researchers, school officials, and visitors who praised the pupils' progress. The question thus arises as to whether the Initial Teaching Alphabet and the Peabody Language Development Kit materials would continue to be effective when this study was replicated with other teachers, and with other approaches to beginning reading where similar extra support and incentives were included. The central purpose of the Cooperative Reading Project (CRP) was to deal with this question.

Purpose

The primary aim of the project was to examine the relative effectiveness of different amounts of oral language stimulation,and of three experimental approaches to teaching beginning reading,with disadvantaged children. Comparable teacher incentives and support were provided in all three reading approaches, and the experimental phase extended over the first two years in school for the subjects. The followup study sought to determine if any differences would be discernible among the various treatment groups after the pupils had completed their third year in school.

METHOD

Research Design

Subjects were enrolled in twelve elementary schools, with nine schools involved in the experimental programs and three providing non-treatment, control subjects. All these schools were located in low socioeconomic areas of the inner city of Nashville, Tennessee, and the majority served mostly children of the Negro race.

The three experimental reading treatments were (1) a highly-phonic, basal reading approach using the 44 sound-symbol, Initial Teaching Alphabet (ITA), (2) the Words-in-Color (WIC) program which introduces each of the 47 speech sounds of the English language (as identified by the author) through the use of a distinct color, (3) and a Supplemented Conventional Reading Program (SCRP) combining a basic reader series with a systematic phonics program. In addition to the reading treatments, two-thirds of the classes in the experimental treatments, during the first year of the project, received an oral stimulation program using Level #1 of the Peabody Language Development Kits (PLDK). Half of these classes who had used PLDK #1 in the first year of the experiment received Level #2 of the PLDK during its second year. The yearly PLDK program consisted of 180 thirty-minute daily lessons designed to stimulate oral language and verbal intelligence, and thus enhance school progress.

Nine experimental treatment conditions were established at the outset of the experiment. (Each of the nine consisted of three teachers who were committed to keeping their pupils through the first two years of school. None of the teachers had participated in our earlier Cooperative Language Development Project.) For each of the three approaches to

beginning reading--ITA, WIC, SCRP--three oral language treatments were established. Within each reading treatment, one-third of the children received no PLDK, one-third received one year of PLDK, and one-third received two years of PLDK. This yielded the nine experimental groups identified in Figure 1. Examination of Figure 1 reveals that Groups 1, 4, and 7 (the without PLDK groups) received no special oral language stimulation treatment. These groups received merely one of the reading approaches as an experimental treatment. Groups 2, 5, and 8 (the one year PLDK groups) received, in addition to the experimental reading treatment, oral language stimulation for the first year of the project only, based on Level #1 of the PLDK. Groups 3, 6, and 9 (the two year PLDK groups) received, in addition to the experimental reading treatment, two years of PLDK oral language stimulation exercises: Level #1 during the first year of the project, and Level #2 during the second year. Besides the nine experimental groups, a control group was established. Teachers and pupils in the control group (group 10) did not participate in any of the experimental treatments or incentives. The classes were only visited for pretesting, posttesting, and followup testing. In summary, the following 10 groups were constituted:

1) Group 1 - ITA followed by a basal reader without PLDK;
2) Group 2 - ITA followed by a basal reader plus one year of PLDK;
3) Group 3 - ITA followed by a basal reader plus two years of PLDK;
4) Group 4 - WIC followed by a basal reader without PLDK;
5) Group 5 - WIC followed by a basal reader plus one year of PLDK;
6) Group 6 - WIC followed by a basal reader plus two years of PLDK;
7) Group 7 - SCRP without PLDK;

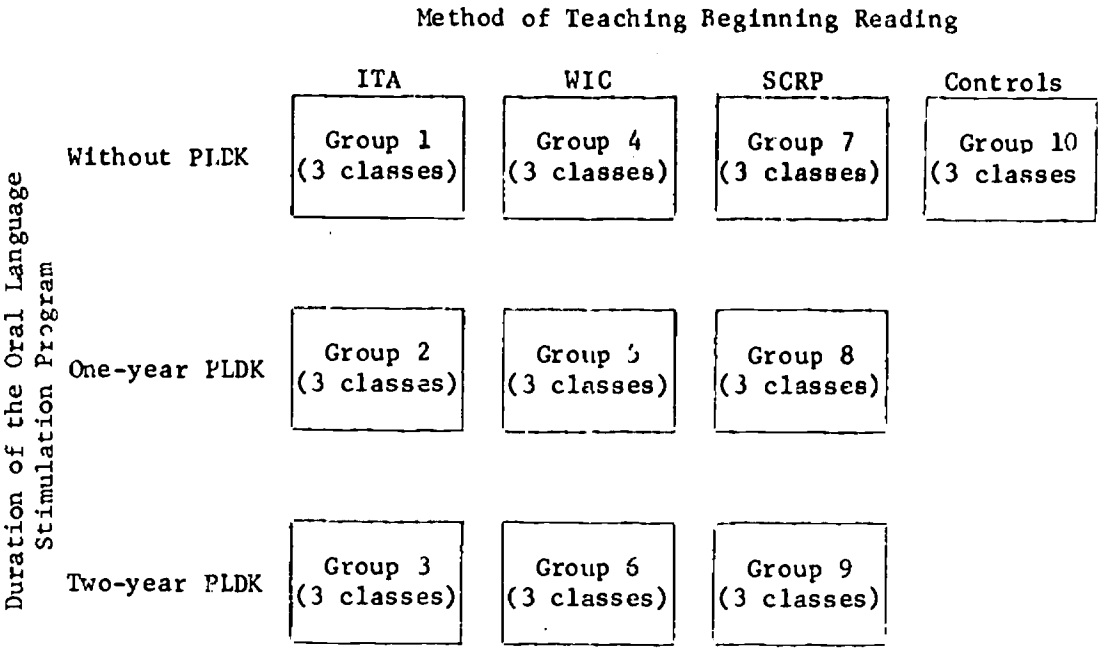

Fig. 1. The basic research design for the Cooperative Reading Project.[1]

8) Group 8 - SCRP plus one year of PLDK;

9) Group 9 - SCRP plus two years of PLDK;

10) Group 10 - Control group (no experimental treatments or incentives).

Experimental Treatments

Brief descriptions of the three initial reading approaches used in the project appear below.

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[1]During the second year of the project, the school system found it necessary to combine certain classrooms. This resulted in a change from three to two classes in the WIC group which received one year of PLDK, as well as in the SCRP group which did not receive PLDK. This resulted in a loss of one class each for Groups 5 and 7. In the followup, third year the subjects were scattered throughout the schools with new teachers who had not been associated with the project.

1) Initial Teaching Alphabet. The Early-to-Read series developed by Mazurkiewicz and Tanyzer (1963) was used as the experimental reading program. In contrast to the Downing Reading Series which utilizes a sight vocabulary approach, the Mazurkiewicz and Tanyzer program is based on the premise that children should first learn the individual sound symbols before being taught to synthesize them into words. Thus, a phonetic rather than a sight vocabulary approach was used. This emphasis appeared to hold special promise for Southern youth who frequently experience difficulty enunciating certain speech sounds.

The ITA children moved from the Early-to-Read series into the Basic Reading series by McCracken and Walcutt (1963). The children transferred into Book 2-1 which gives a systematic review of the phonic approach to beginning reading in TO. In the third, non-experimental year the ITA children were provided with the Reading-for-Meaning series, published by Houghton Mifflin (McKee, Harrison, McCowen, & Lehr, 1963) and used generally in the Nashville Metro School System.

2) Words-in-Color. The Words-in-Color program (Gattegno, 1963) is organized around a phonetic analysis of the English language as it is typically spoken. It utilizes color to facilitate the learning and recognition of the basic speech sounds used in reading. Under this system, each of the 47 speech sounds of English identified by Gattegno is expressed by a specific color. Individual letters (or groups of letters) are colored according to how they sound in a given word. For example, the underlined portion of the following words would appear in the same color because they represent the same sound: late, way, waite, they, and straight. In contrast, although the spelling is identical, the

underlined portion of the following words would be in a different color because each word represents a different speech sound: thought, though, bough, and through.

The short sounds of the vowels are introduced first using colored chalk at the chalkboard. From the very beginning, the program stresses that the learner takes over the responsibility of producing the sounds associated with the signs. Until the pupils can vocalize the oral model accurately, the teacher is urged to give the auditory model, accompanied by the visual model. Therefore, the teacher supplies the visual model and the pupils vocalize its speech equivalent. The modeling is usually done with only one or two of the short vowel sounds. The teacher gives the children the opportunity to produce the remaining vowel-consonant combinations without vocal prompting. The WIC materials consist of colored phonic code wall charts, colored word building wall charts, work-sheets, a word building book, three pupil books, color-keyed word cards, and a book of stories.

The program is basically designed to build word attack skills. It is supposed to be completed within a relatively short period of time, usually 12 weeks, with average and above average children. This initial period is then followed by any basal reading program. However, the teachers in WIC found that the program took much longer for their pupils to master than the literature suggested. Thus, the WIC teachers did not formally go into a specific basal reading program during the first year of the treatment. However, during the Spring, several levels of the Basic Reading series by McCracken and Walcutt were placed in their rooms as supplementary materials. This reading series was continued into the

second year. The WIC pupils (like the other pupils) in the third, non-experimental year moved into the regular program provided by the schools (i.e., the Houghton Mifflin Reading-for-Meaning series).

3) Supplemented Conventional Reading Program. The Supplemented Conventional Reading Program (SCRP) used a basal reading series supplemented by a systematic phonics program. The basal program was the Reading-for-Meaning series by McKee, Harrison, McCowen, and Lehr (1963), published by Houghton Mifflin. This program was supplemented by the Reading with Phonics program, published by Lippincott, which is generally known as the Hay-Wingo phonic drills (1960).

The Houghton Mifflin Reading-for-Meaning series is based on the premise that the typical English-speaking child brings to school a sizable speaking vocabulary, and that the major problem he encounters in beginning reading is finding a way to convert a printed word into its familiar spoken form. To accomplish this, a single technique is employed for unlocking new words. This consists of using both (1) the context of the sentence and (2) the beginning sound of the word. Some ending and middle sounds are introduced later in the program. At the pre-reading level, 18 single (one letter) consonants and four digraphs (sh, wh, th, ch) are taught. The other consonants and the vowels, plus common endings and other syllables, are introduced as they are needed. The basic vocabulary is carefully controlled. The teacher helps the children learn new words by using the program's basic word-attack technique. The teacher's guides which accompany each of the readers furnish (1) detailed lesson plans, (2) suggestions for meeting the needs of fast and slow learners, (3) and suggestions for the use of numerous supplementary materials

produced as a part of the program.

Reading with Phonics by Hay and Wingo (1960) is not a basic reading program, but is a phonic skills program designed to develop independence in word attack skills. It makes the assumption, as does the Reading for Meaning program,that first grade children already have a large speaking vocabulary and need a word recognition program. The materials consist of one textbook and three workbooks. The phonic elements are learned through the auditory, visual, and kinesthetic sense modalities. The children are first taught to listen for a sound and then to associate the sound and its visual symbol. Kinesthetic development takes place in the correct movement of the tongue and eyes, and the development of hand and arm through writing (Hay & Wingo, 1960).

In the third, non-experimental year the SCRP pupils continued on in the Houghton Mifflin Reading-for-Meaning series provided by the local school system.

(Throughout all three years of the project the control subjects remained in the Reading-for-Meaning series by Houghton Mifflin.)

A brief description of the oral language stimulation program appears below:

(4) Peabody Language Development Kits. As already indicated, Levels #1 and #2 of the PLDK, developed by Dunn and Smith (1965, 1966) were used in this study. Level #1 was designed for first grade and Level #2 for second grade disadvantaged children. The lessons were constructed to stimulate oral language and verbal intelligence, as well as to enhance school progress. Each of the levels of the kits consisted of 180 daily lessons--one for each day of a school year. The lessons

provided 30 to 35 minutes of well-planned daily oral language stimulation exercises. The philosophy of the program was that Language Time should be a half-hour interlude from conventional school work. Though early lessons required considerable teacher participation, the overall goal was to maximize the oral language behavior of the pupils in order to give them opportunities to talk, think, and learn effectively.

Subjects

At the onset of the CRP experiment, nine first grade classes were selected for each of the three reading treatments. (The ITA treatments were given at the same three schools which provided ITA instruction for the Cooperative Language Development Project. Three new schools were identified for each of the WIC and SCRP treatments.) This resulted in a total of 27 experimental classes with about 750 experimental subjects. Moreover, some 150 first graders were drawn from 12 classes in three schools to serve as control subjects. This gave a total initial pool of about 900 pupils. At the onset of the project, complete pretest data were obtained on 838 subjects, 712 experimental and 126 control children. The original subject pool was reduced over the two-year treatment period due to some children being transferred out of experimental schools, and to other children not being available for posttesting and followup testing. At posttesting, 538 subjects--473 experimental and 65 control subjects--constituted the posttest subject pool. This number had dropped to 354--306 experimental and 48 control subjects. (Approximately 80 per cent of the children were Negro, while the remaining subjects were Caucasian.)

Basic socioeconomic information, including the educational level of the best educated parent, housing conditions, and income level was obtained by rating on the Peabody Cultural Opportunity Scale (see Appendix A in Dunn, Pochanart, & Pfost, 1967.) These data confirmed that the project children came from disadvantaged backgrounds. Their families fell at the lower end of the socioeconomic continuum. On the basis of our socioeconomic status information, children were deleted from the final evaluation who came from families that: (1) the total family income was over $9,000, (2) lived in a very good house or apartment, (3) lived in a good house or apartment and the total family income was over $6,000, (4) the main wage earner was employed as a professional, technical, or a managerial worker, or (5) the best educated parent had four or more years of college training.

Teachers

Initially, 39 teachers participated in the study--27 as experimental teachers and 12 as control teachers. The teachers were selected by their principals on the basis of their availability and willingness to participate in the study. All the participating teachers in any one school were assigned to the same treatment. This was necessary to facilitate the administration and supervision of the project, as well as to provide an opportunity for the teachers to share ideas. Each teacher was required to keep her pupils for the two years of the experiment. Due to the partial closing of a school, one teacher in the SCRP treatment was placed in a school where three teachers were in the WIC program. Moreover, during the second year, changes in teaching personnel occurred in one class in the SCRP plus one-year PLDK group, and in one class of the

ITA plus one-year PLDK group. In addition, each of the WIC and SCRP treatments lost another teacher. Since the number of children in these classes had been reduced substantially at the end of the first year, the remaining children were absorbed into other rooms. These changes resulted in a total of nine ITA teachers, eight WIC teachers, and eight SCRP teachers for the second year of the project.

Background data were collected on the original project teachers. Of the original 39 teachers, 21 had earned a B.A. degree, 17 had earned a M.A. degree, and there was one non-degree teacher in the SCRP plus PLDK treatment. The median total years of experience was seven or more years. There was only one teacher, in the SCRP treatment, who had no teaching experience. The median number of years for teaching first grade was four years, six months. Five of the original teachers in the project, however, were teaching first grade for the first time. Two of these teachers were in the ITA plus PLDK treatment, one in WIC, one in WIC plus PLDK, and one in the SCRP.

To obtain ratings on overall effectiveness in teaching reading, three persons rated each of the teachers. All three were college instructors holding an earned doctorate with competence in reading instruction. These raters were not involved in the project in any other way than to rate the teachers. The median rating for the total group of teachers,on a five point scale, was average. Four teachers received a rating of poor: two in the ITA plus PLDK, one in the SCRP, and one in the control group. There were three teachers who received a rating of excellent: one each were in WIC plus PLDK, in SCRP without PLDK, and in the control group. Furthermore, four of the nine control teachers

received a rating of good and one of excellent. (Each of these latter teachers were members on the teaching staff of the only school in the district that was accredited by the Southern Association of Colleges and Schools. This school and its personnel had met a set of criteria that had not been attained in any of the other schools participating in the project.)

Supervision and Training of Teachers

Initial training sessions for the teachers in all treatments were held during the first week in September, 1965. The PLDK, ITA, and WIC treatments were all new to the teachers. The SCRP treatment materials were not so novel since the Houghton Mifflin Reading-for-Meaning series was already used in the schools, and some of the teachers had used the Hay-Wingo phonic drills.

Each of the four treatments (PLDK, ITA, WIC, and SCRP) had a consultant who handled the initial training, and visited the teachers in their treatment group throughout the year. The consultants also met twice a month with their teachers during each of the two years of the experiment (i.e., 1964-65, and 1965-66).

Teacher Incentives

The experimental teachers were given a number of incentives not available to the control teachers. They were provided with small supplementary stipends and were asked to attend in-service training sessions throughout the year. Supplementary materials were purchased for the experimental teachers. They were visited frequently by the researchers and school officials. Furthermore, they were given considerable recognition by their principals and had an opportunity to observe each other teach. They were visited regularly by a consultant and were paired up in

schools to enable them to share informally their innovations and problems. Thus, the experimental teachers knew they were being monitored, and motivation to excellence in teaching was high. In contrast, the control teachers were not given comparable stimulation or support. Their children were simply tested at the beginning of the experiment and retested at the end of each school year. Consequently, a very important part of the experimental treatment was the added incentives provided the experimental teachers for the first two years, but not to the control teachers. (During the third year, no additional incentives were available to the teachers of either the experimental or control subjects.)

Evaluation Instruments

Six measures were obtained to study pupil progress. They are described briefly below.

1) General Intellectual Functioning. The 1960 Stanford-Binet Intelligence Scale (Terman & Merill, 1960) was used to secure data on general intellectual functioning. The Stanford-Binet (S-B) is a standardized, individually administered intelligence scale yielding mental age and intelligence quotient scores. The test items range from the simple manipulation of objects to abstract reasoning. They are grouped into age levels, in an ascending order of difficulty, ranging from age two to superior adult.

2) Psycholinguistic Development. The Illinois Test of Psycholinguistic Abilities (McCarthy & Kirk, 1961) was used to measure oral language functioning. It was administered by psychologists and psychometric technicians. This test (ITPA) was developed as an individual language test for children between the ages of two-and-one-half and nine

years. The ITPA consists of nine subtests which measure two input channels (auditory and visual), two output channels (vocal and motor), and two levels of organization (representational and automatic-sequential). Its major weakness as a followup test was its "lack of top."

3) Creative Thinking. The Research Edition of Torrance Tests of Creative Thinking (Torrance, 1966) were used as a measure of creative thinking. This test battery has both verbal and figural tasks. Only the first four Verbal Subtests of Form A were administered in the CRP evaluation. These four tests included the following activities:

(a) The Ask and Guess Activity (Test #1)--asking questions about a drawing. The questions are not answerable by merely looking at the picture.

(b) The Guess Causes Activity (Test #2)--making guesses about the causes of the event pictured.

(c) The Guess Consequences Activity (Test #3)--making guesses about the possible consequences of the event.

(d) The Product Improvement Activity (Test #4)--producing ideas for improving a toy so that it will be more fun for children to play with.

Although the norms exist on the Torrance Tests, raw scores were used in all statistical analyses. Three scores were obtained for the Verbal Subtests (fluency, flexibility and originality). These three test scores are defined as:

(a) Verbal Fluency--ability to produce a large number of ideas with words.

(b) Verbal Flexibility--ability to produce different types of ideas or strategies.

(c) Originality--ability to produce ideas that are distinct from the obvious and commonplace. (Torrance maintains that subjects who achieve a high score on Verbal originality usually have a great deal of intellectual energy and may be rather nonconforming.)

These three scores were averaged to provide the Verbal Subtest score used in the followup analyses.

The Verbal Subtests of the Torrance Tests of Creative Thinking were included because research has shown that they appear to be sensitive to the differential kinds of growth or change resulting from different teaching procedures, environmental conditions, etc. Moreover, they appear to be especially sensitive to one of the kinds of skills the Peabody Language Development Kits attempt to develop--namely divergent thinking (including brainstorming).

4) School Achievement. The Metropolitan Achievement Test (MAT) was used to measure academic achievement. At the end of the third year, the written language portions of the Elementary Battery were administered (Durost, Bixler, Hildreth, Lund, & Wrightstone, 1959). These consisted of the Word Knowledge (WK), Word Discrimination (WD), Reading Comprehension (R), Spelling (S), and Language (L) Subtests. The achievement testing took place from late March to mid-May. Actual grade placement at time of testing averaged about 3.75 (mid-April). All achievement testing was conducted by project personnel, not by the classroom teachers.

5) Written Language Development. The Written Picture Story Language Test (Myklebust, 1965) was used to assess written language abilities. The

children were asked to write a story about a picture. The writing samples were evaluated for: a) productivity, b) correctness, and c) meaning level or abstraction. Productivity was measured by computing the total number of words, total number of sentences and number of words per sentence. Grammatical correctness (or syntax) was evaluated by assessing accuracy in the use of word usage, word endings, and punctuation. Meaning (or level of abstraction) was measured by means of an Abstract-Concrete Scale with score values ranging from zero to 25. (Only raw scores are reported in this paper.)

6) Oral Language Development. An Oral (Spoken) Picture Story Language Test was designed by the project staff to parallel the Myklebust Written Picture Story Language Test. This test was also modeled somewhat after our earlier Peabody Language Production Inventory (Nelson, 1964). A street scene involving a dog catcher, dog, and children was devised. Each child was asked to tell a story about the picture. The taped stories were transcribed and scored to yield raw score measures of a) productivity, and b) meaning level or abstraction. As in the Myklebust test, productivity was measured by computing the total number of words, total number of sentences, and number of words per sentence. Meaning was assessed by means of an Abstract-Concrete Scale with score values ranging from zero to 22 (it was not necessary to go as high as 25 to score our subjects). This test is a non-standardized measure for which only raw scores were available.

Test Schedule

The first year of the experiment was 1965-66 when the children were in grade one. The second and final year of the experiment was 1966-67

when the children were in the second grade. The following year was 1967-68 when the children were enrolled in the third grade.

The pretesting was done in September, 1965. The interim, post, and followup testing was completed during the Spring of the year, beginning in mid-March and terminating in early June. All testing was conducted by psychometric technicians working under the direction of psychological examiners.

Analysis of Data

As mentioned earlier, the results reported in this paper are primarily the followup statistics. However, some post and followup descriptive statistics are also presented (e.g., with the MAT). We presented certain of these descriptive statistics because our sample was reduced a little from posttesting to followup testing (from 408 to 354). However, the attrition of 54 subjects appeared to be distributed equally across all of the various treatment groups. Therefore, we had no reason to believe the descriptive and inferential statistics presented at the time of posttesting would not parallel this year's posttest data. (The reader is referred back to our earlier monograph for the inferential statistics on posttest results.) The essential duplication of post-test descriptive statistics in this report is simply to facilitate the ability of the reader to compare the followup and posttest statistics.

Analyses of variance were used to compare treatments among groups. Since there was an exploratory educational intervention study, the 0.90 level of confidence was used throughout. To analyze significant main effects and interactions, t-tests were run when appropriate.

The data were analyzed in two different ways. First, a 3 x 3 x 2 factorial analysis of variance was used to contrast the three experimental reading programs in combination with the PLDK treatments (see Figure 2). These comparisons will be referred to as the "reading groups" analyses. Second, a 4 x 2 analysis of variance was used to contrast the various PLDK experimental reading groups with the control group. It was assumed that type of experimental reading instruction would not effect markedly the success of the PLDK lessons. Therefore, the ITA, WIC, and SCRP groups were collapsed for purpose of this second analysis. (It was recognized that ITA plus PLDK had been more facilitating than ITA plus TO in the original CLDP study, but this was assumed due to the ITA being in an experimental program, while the TO children served as controls only.) This second inspection of the data is referred to as the "PLDK" analyses.

The analysis of variance design for the reading groups analyses is illustrated in Figure 2. When pre-, post-, and followup-test scores were analyzed a 3 x 3 x 3 x 2 mixed Type III extended analysis of variance was used (Lindquist, 1953). (This later design was used only on the Stanford-Binet and ITPA analyses.)

The PLDK 4 x 2 analysis is illustrated in Figure 3. When pre-, post-, and followup-test scores were analyzed, this became a 3 x 4 x 2 mixed Type III analysis of variance (Lindquist, 1953). (This latter design was used only in the Stanford-Binet and ITPA analyses.)

Findings at the End of the Experimental Period

At the end of the two year experimental period of the CRP, when the children had completed the second grade, the following were the two major findings:

1/ On written language achievement, the SCRP reading group was significantly superior to the ITA and WIC reading groups. In addition, there was some tendency for the ITA group to be superior to the WIC group. Since the SCRP group received the most systematic phonic training program, the experimental reading results appear to indicate

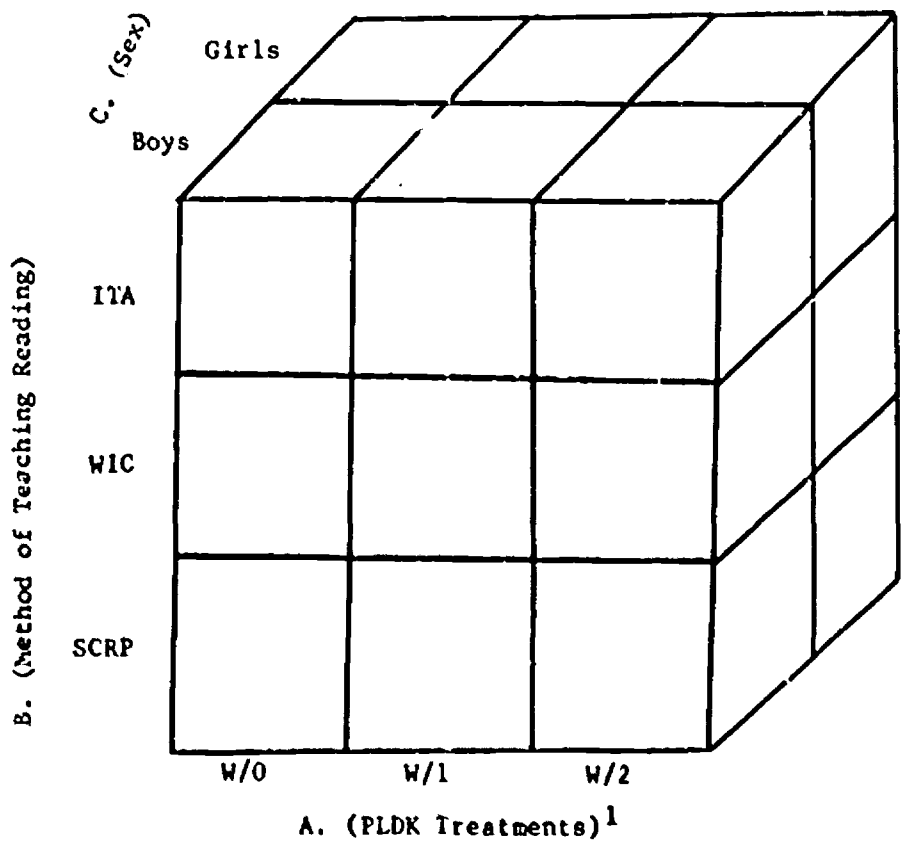

Fig. 2. Pictorial view of the analysis of variance design used to study experimental reading methods.

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[1]W/O = experimental reading treatment without PLDK lessons; W/1 = experimental reading treatment plus one year of PLDK lessons; W/2 = experimental reading treatment plus two years of PLDK lessons.

that the inclusion of systematic training in these skills complements the materials of the basal reading programs when presented in traditional orthography.

2) The exercises from the Peabody Language Development Kits facilitated the development of certain linguistic skills as measured by the ITPA. Moreover, the PLDK lessons had a salutary effect upon the development of free, connected speech as measured by the Peabody Language Production Inventory. However, experience with PLDK did not appear to generalize to the area of academic achievement and intellectual development. In general, the results of this two-year intervention project did not give as optimistic a picture about the effectiveness of ITA and PLDK as was demonstrated

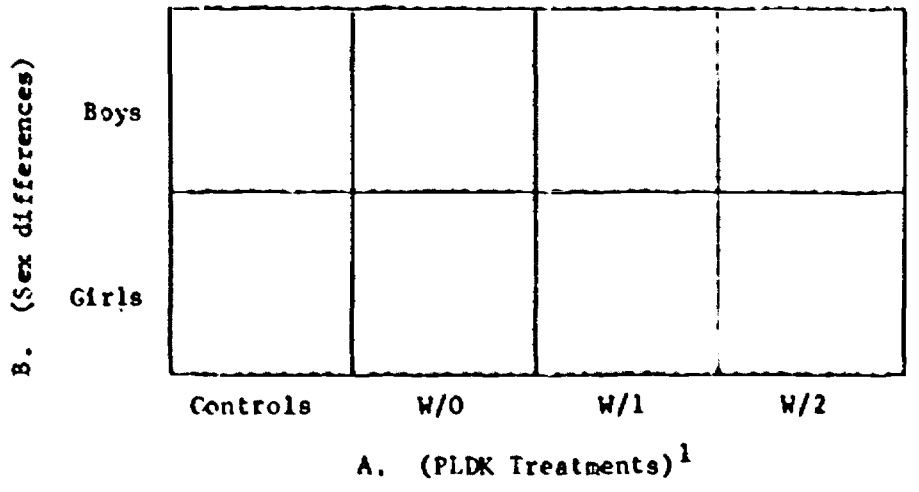

Fig. 3 Pictorial view for the analysis of variance design used to study the PLDK treatments.

[1] W/0 = experimental reading treatment without PLDK lessons; W/1 = experimental reading treatment plus one year of PLDK lessons; W/2 = experimental reading treatment plus two years of PLDK lessons.

in the earlier Cooperative Language Development Project.

Data will now be presented on the status of the effectiveness of the interventions after the one-year followup period.

Results and Discussion

Characteristics of the Subjects

The pretest characteristics of the selected sample of 354 subjects used in the third-grade, followup analysis are outlined in Table 1. These data describe the children when they entered the first grade--and the Cooperative Reading Project--in the Fall, 1965. The subjects averaged 6-2 (73.92 months) in chronological age, 86.87 in Stanford-Binet IQ scores, and 5-2 (62.37 months) in language age on the Illinois Test of Psycholinguistic Abilities. These descriptive statistics in Table 1 demonstrate that the treatment groups differed very little from each other on the three measures. This is confirmed in Table 2 which provides the analysis of variance data on these statistics. As will be seen, none of the differences was statistically significant. Thus, it was possible to use analysis of variance in subsequent treatments of the data.

I. The First Analysis (PLDK Treatments by Experimental Reading Approaches by Sex Differences)

This section examines the effectiveness of both the PLDK treatments and the experimental reading interventions. Too, it permits a look at differences in performance between boys and girls. What it does not contain are data on the control group. As will be seen in Figure 2, the basic research design was a 3 x 3 x 2 one. It was not possible to include a control group in this balanced design. (Instead, most of the control

Table 1

Summary of Pretest Data on Selected Samples by Treatment Group

Treatment Group	N	CA $\bar{X}$	CA S	IQ $\bar{X}$	IQ S	LA $\bar{X}$	LA S
ITA without PLDK							
Boys	20	73.40	3.78	88.25	11.47	63.40	7.34
Girls	20	73.30	4.35	88.85	9.43	63.05	8.12
Total	40	73.35	4.02	88.55	10.37	63.22	7.64
ITA with one year PLDK							
Boys	20	74.75	3.32	85.95	8.42	61.75	9.01
Girls	20	74.20	3.75	83.40	14.11	59.30	9.73
Total	40	74.48	3.51	84.68	11.54	60.52	9.34
ITA with two years PLDK							
Boys	20	73.90	4.99	88.15	9.83	59.15	7.87
Girls	20	72.55	3.17	86.75	10.48	63.75	8.19
Total	40	73.22	4.18	87.45	10.05	61.45	8.26
WIC without PLDK							
Boys	17	74.47	4.00	86.82	9.11	61.82	9.12
Girls	17	74.88	3.89	81.29	10.09	60.71	9.10
Total	34	74.68	3.89	84.06	9.87	61.26	8.99
WIC with one year PLDK							
Boys	17	73.76	3.65	86.71	12.51	63.88	8.47
Girls	17	72.94	1.71	89.35	10.88	63.76	9.56
Total	34	73.35	2.84	88.03	11.62	63.82	8.89
WIC with two years PLDK							
Boys	17	74.35	3.97	85.94	8.50	63.00	8.16
Girls	17	74.59	3.57	87.00	9.41	65.71	9.40
Total	34	74.47	3.72	86.47	8.85	64.35	8.78
SCRP without PLDK							
Boys	14	75.07	3.45	84.86	8.89	60.64	5.65
Girls	14	74.57	2.79	93.57	10.36	65.50	7.06
Total	28	74.82	3.09	89.21	10.46	63.07	6.74
SCRP with one year PLDK							
Boys	14	73.71	5.92	88.21	13.81	63.29	7.98
Girls	14	73.29	6.09	87.14	8.62	65.29	6.74
Total	28	73.50	5.90	87.68	11.31	64.29	7.32
SCRP with two years PLDK							
Boys	14	75.07	5.21	94.00	9.11	64.93	8.78
Girls	14	73.71	4.97	83.21	8.86	61.43	7.80
Total	28	74.39	5.04	88.61	10.39	63.18	8.34
Experimental Reading Totals							
ITA	120	73.68	3.92	86.89	10.71	61.73	8.45
WIC	102	74.17	3.53	86.19	10.21	63.15	8.90
SCRP	84	74.24	4.80	88.50	10.62	63.51	7.43
Experimental PLDK Totals							
Without PLDK	102	74.20	3.77	87.24	10.38	62.53	7.87
With one year PLDK	102	73.83	4.12	86.62	11.50	62.66	8.77
With two years PLDK	102	73.96	4.29	87.44	9.70	62.89	8.47
Grand Experimental Total							
Boys	153	74.24	4.21	87.56	10.29	62.34	8.10
Girls	153	73.75	3.90	86.63	10.77	63.05	8.61
Total	306	74.00	4.06	87.10	10.53	62.69	8.35
Controls							
Boys	24	73.75	3.69	83.00	10.19	60.50	5.60
Girls	24	73.04	3.56	87.79	10.27	60.12	6.43
Total	48	73.40	3.60	85.40	10.40	60.31	5.97
Grand Total							
Boys	177	74.18	4.13	86.94	10.36	62.09	7.82
Girls	177	73.66	3.85	86.79	10.39	62.65	8.39
Total	354	73.92	4.00	86.87	10.51	62.37	8.10

Table 2

Analysis of Variance on Pretest Data by Treatment Group

Variable	Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.95}$
CA	Between Groups	9	132.4660	14.7180	0.9190	1.88
	Within Groups	344	5508.9920	16.0140		
	Total	353	5641.4577			
SB-IQ	Between Groups	9	999.8600	111.0960	1.0058	1.88
	Within Groups	344	37994.9400	110.4500		
	Total	353	38994.8000			
ITPA-LA	Between Groups	9	784.3900	87.1540	1.3391	1.88
	Within Groups	344	22388.2100	65.0820		
	Total	353	23172.6000			

subject data are included in the second analysis later in this report.)

The number of subjects involved in the experimental treatment was 306. (These 306 pupils plus the 48 controls yields the total of 354 subjects discussed in this total followup report.) Already presented in Tables 1 and 2 were the pretest descriptive and influential statistics on all of these 354 subjects, including the 306 pupils studied in this section of the report. Clearly, no differences in CA, IQ or LA existed among the various experimental groups at pretest time.

Presented below are the statistics on pupil performance for the six measures listed and described earlier in this report.

1) General Intellectual Functioning. The descriptive statistics on pretest, posttest, followup test data and gain IQ scores from the Stanford-Binet Intelligence Scale are reported in Table 3. In terms of overall experimental totals, the average IQ of the 306 subjects, upon entering school, was 87.10. By the end of the second grade, their average IQ score had risen only 3.04 points to 90.14. By the end of the third grade the subjects had lost an average of 1.40 points and had a mean IQ score of 88.74. In terms of these descriptive statistics, the gains and losses from pre-, to post-, to followup testing appeared to be minimal. All of the experimental reading groups dropped slightly in IQ scores from post- to followup testing (-.90 for the ITA, -1.76 for the WIC, and -1.69 for the SCRP groups). The pattern for the PLDK treatment groups was similar. From post- to followup testing the "without PLDK" group (W/O) dropped 1.38 IQ points, the "with one year PLDK" group (W/1) increased 0.11 IQ points, and the "with two years PLDK" group (W/2) decreased 2.95 points. These discouraging followup findings suggest the

Table 3

Means and Standard Deviations on IQ Scores on the Stanford-Binet Intelligence Scale: Pretest-, Posttest-, Follow-up-, and Gain-Scores

Treatment Group	N		Pre	Post	Follow-up	Gain[a]	Gain[b]	Gain[c]
ITA without PLDK								
Boys	20	$\bar{X}$	88.25	92.00	89.60	3.75	1.35	-2.40
		S	11.47	12.27	11.87			
Girls	20	$\bar{X}$	88.85	89.35	88.25	0.50	-0.60	-1.10
		S	9.43	13.64	13.90			
Total	40	$\bar{X}$	88.55	90.68	88.92	2.13	0.37	-1.76
		S	10.37	12.87	12.78			
ITA with one year PLDK								
Boys	20	$\bar{X}$	85.95	87.55	90.00	1.60	4.05	2.45
		S	8.42	10.24	13.05			
Girls	20	$\bar{X}$	83.40	84.00	85.00	0.60	1.60	1.00
		S	14.11	15.39	16.74			
Total	40	$\bar{X}$	84.68	85.78	87.50	1.10	2.82	1.72
		S	11.54	13.03	15.03			
TA with two years PLDK								
Boys	20	$\bar{X}$	88.15	88.30	85.55	0.15	-2.60	-2.75
		S	9.83	13.60	11.39			
Girls	20	$\bar{X}$	86.75	88.30	85.70	1.55	-1.05	-2.60
		S	10.49	11.84	10.07			
Total	40	$\bar{X}$	87.45	88.30	85.62	0.85	-1.83	-2.68
		S	10.05	12.59	10.61			
WIC without PLDK								
Boys	17	$\bar{X}$	86.82	89.71	87.41	2.88	0.59	-2.29
		S	9.11	14.17	12.23			
Girls	17	$\bar{X}$	81.29	85.47	85.35	4.18	4.06	-0.12
		S	10.09	14.84	12.87			
Total	34	$\bar{X}$	84.06	87.59	86.38	3.53	2.32	-1.21
		S	9.87	14.45	12.41			
WIC with one year PLDK								
Boys	17	$\bar{X}$	86.71	90.71	89.06	4.00	2.36	-1.64
		S	12.51	17.17	15.81			
Girls	17	$\bar{X}$	89.35	92.35	93.24	3.00	3.89	0.89
		S	10.88	12.31	14.89			
Total	34	$\bar{X}$	88.03	91.53	91.15	3.50	3.12	-0.38
		S	11.62	14.73	15.27			
WIC with two years PLDK								
Boys	17	$\bar{X}$	85.94	89.82	88.76	3.88	2.82	-1.06
		S	8.50	12.49	13.93			
Girls	17	$\bar{X}$	87.00	92.06	85.76	5.06	-1.24	-6.30
		S	9.41	13.67	10.81			
Total	34	$\bar{X}$	86.47	90.94	87.26	4.47	0.79	-3.68
		S	8.85	12.94	12.37			
SCRP without PLDK								
Boys	14	$\bar{X}$	84.86	93.07	91.79	8.21	6.92	-1.29
		S	8.89	13.36	11.28			
Girls	14	$\bar{X}$	93.57	92.07	91.29	-1.50	-2.29	-0.79
		S	10.36	13.52	12.62			
Total	28	$\bar{X}$	89.21	92.57	91.54	3.36	2.33	-1.03
		S	10.46	13.20	11.75			
SCRP with one year								
Boys	14	$\bar{X}$	88.21	90.29	89.00	2.07	0.79	-1.28
		S	13.81	13.22	13.31			
Girls	14	$\bar{X}$	87.14	92.43	90.57	5.29	3.43	-1.86
		S	8.62	9.29	11.88			
Total	28	$\bar{X}$	87	91.36	89.78	3.68	2.10	-1.58
		S	11	11.57	12.40			
SCRP with two years PLDK								
Boys	14	$\bar{X}$	9		94.21	4.93	0.21	-4.72
		S			7.16			
Girls	14	$\bar{X}$	-		91.00	8.00	7.79	-0.21
		S			12.64			
Total	28	$\bar{X}$	8		92.61	6.46	4.00	-2.46
		S	1		10.21			
Experimental Reading Totals								
ITA	120	$\bar{X}$	8		87.35	1.36	0.46	-0.90
		S	1		12.89			
WIC	102	$\bar{X}$	8		88.26	3.83	2.07	-1.76
		S			13.45			
SCRP	84	$\bar{X}$	8		91.31	4.50	2.81	-1.69
		S	1		11.41			
Experimental PLDK Totals								
Without PLDK (W/0)	102	$\bar{X}$			88.79	2.93	1.55	-1.38
		S			12.42			
With one year PLDK (W/1)	102	$\bar{X}$	8		89.34	2.61	2.72	0.11
		S	1		14.39			
With two years PLDK (W/2)	102	$\bar{X}$	8		88.09	3.60	0.65	-2.95
		S	9		11.39			
Grand Experimental Total								
Boys	153	$\bar{X}$			89.29	3.31	1.73	-1.58
		S			12.38			
Girls	153	$\bar{X}$			88.19	2.79	1.56	-1.23
		S			13.15			
Total	306	$\bar{X}$			88.74	3.04	1.64	-1.40
		S			12.76			

[a]Posttest minus pretest IQ.
[b]Follow-up test minus pretest IQ.
[c]Follow-up test minus posttest IQ.

probability that the children had a very non-stimulating year in the third grade.

The analysis of variance data in Table 4 reveal no significant "PLDK treatment" main effect. However, there was a significant main effect on the "Reading Method" dimension. There was also a significant main effect over Test Years. The t-test analyses revealed that the overall IQ scores for the SCRP group were significantly above both the ITA and WIC groups. This breakdown also revealed the discouraging finding that, while there was a significant IQ score increase from pre- to post-testing, no significant differences existed between pre- and followup IQ test scores. In other words, what intellectual stimulation the children had received during their first two years of school was lost in their third grade. Apparently, progressive intellectual deterioration had already set in for these children of poverty.

Table 4 also indicates the presence of a significant interaction among Test Years by PLDK by Reading Method by Sex variables (A x B x C x D). This effect is next to impossible to unscramble. But, generally, nothing clearcut in terms of our predicted results is discernable from the morass of t-tests we broke down and examined relative to this complex statistical phenomenon. All three WIC groups--W/0, W/1 and W/2--gained significantly in IQ scores from pre- to post-test. In many cases, the SCRP groups also gained significantly from pre- to post-test. However, the ITA groups failed to make significant IQ gains. Even after losses in the third grade, the followup IQ scores of many of the WIC and SCRP groups were significantly higher than at pretesting. Finally, the total WIC reading group and the WIC girls with two years of PLDK decreased significantly in IQ

Table 4

Analysis of Variance on IQ scores of the Stanford-Binet Intelligence Scale Pretest, Posttest, and Follow-up Scores

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
Between Subjects	305	111919.0000	366.9480		
B (PLDK)	2	34.8000	17.4000	0.0473	2.30
C (Reading Method)	2	1870.2000	935.1000	2.5439*	2.30
D (Sex)	1	309.3000	309.3000	0.8414	2.71
B x C	4	1858.3000	464.5750	1.2639	1.94
B x D	2	131.1000	65.5500	0.1783	2.30
C x D	2	84.2000	42.1000	0.1145	2.30
B x C x D	4	1767.1000	441.7750	1.2018	1.94
Error (b)	288	105864.0000	367.5830		
Within Subjects	612	27844.8000	45.4980		
A (Test Years)	2	1422.3000	711.1500	16.6155***	2.30
A x B	4	251.0000	62.7500	1.4661	1.94
A x C	4	311.3000	77.8250	1.8183	1.94
A x D	2	10.6000	5.3000	0.1238	2.30
A x B x C	8	238.2000	29.7750	0.6957	1.67
A x B x D	4	193.8000	48.4500	1.1320	1.94
A x C x D	4	35.7000	8.9250	0.2085	1.94
A x B x C x D	8	728.9000	91.1130	2.1288**	1.67
Error (w)	576	24653.0000	42.8000		
Total	917	139763.8000			

*p <.10
**p <.05
***p <.01

scores from post- to followup testing.

In light of these statistical analyses of IQ scores, the following conclusions are drawn:

a) At time of posttesting, the PLDK exercises did not lead to differentials in IQ scores. It is not surprising that this finding continued into the followup analysis. In this Cooperative Reading Project, one must conclude that the PLDK Lessons did not raise IQ scores appreciably.

b) Overall, the SCRP group had higher IQ scores over the three testings than the ITA or WIC groups. Furthermore, the total WIC reading group decreased significantly in IQ scores from post- to followup testing.

c) While IQ scores had increased significantly from pre- to post-testing, an unanticipated, and shocking finding of this study was that these scores had fallen back to the initial level by the time of followup testing. It would appear what intellectual stimulation the children had received during their first two (experimental) years in school was lost in the third grade.

2) Psycholinguistic Development. The descriptive pre-, post-, and followup test data for language age (LA) in months on the Illinois Test of Psycholinguistic Abilities appear in Table 5. In terms of grand experimental totals, the 306 subjects gained 18.42 months in language during their first two years in school for an average of 9.21 months per year. During their third year in school they increased 8.53 months, for a total of 26.95 months in LA from pre- to followup testing--a time span of some 32 months. In terms of differences across PLDK groups, the gains from pre- to followup testing were fairly even, with the largest (27.93)

Table 5

Means and Standard Deviations on LA Scores of the Illinois Test of Psycholinguistic Abilities: Pretest-, Posttest-, Follow-up-, and Gain-Scores

Treatment Group	N		Pre	Post	Follow-up	Gain[a]	Gain[b]	Gain[c]
ITA without PLDK								
Boys	20	$\bar{X}$	63.40	79.75	91.80	16.35	28.40	12.05
		S	7.34	9.66	12.02			
Girls	20	$\bar{X}$	63.05	80.15	91.65	17.10	28.60	11.50
		S	8.12	12.87	13.15			
Total	40	$\bar{X}$	63.22	79.95	91.72	16.73	28.50	11.77
		S	7.64	11.23	12.43			
ITA with one year PLDK								
Boys	20	$\bar{X}$	61.75	82.25	92.45	20.50	30.70	10.20
		S	9.01	12.50	12.54			
Girls	20	$\bar{X}$	59.30	76.80	84.40	17.50	25.10	7.60
		S	9.73	12.81	15.05			
Total	40	$\bar{X}$	60.52	79.52	88.42	19.00	27.90	8.90
		S	9.34	12.56	14.27			
ITA with two years PLDK								
Boys	20	$\bar{X}$	59.15	79.30	86.50	20.15	27.35	7.20
		S	7.87	10.66	12.64			
Girls	20	$\bar{X}$	63.75	77.00	85.30	13.25	21.55	8.30
		S	8.19	7.59	9.62			
Total	40	$\bar{X}$	61.45	78.15	85.90	16.70	24.45	7.75
		S	8.26	9.21	11.10			
WIC without PLDK								
Boys	17	$\bar{X}$	61.82	79.24	84.12	17.42	22.30	4.88
		S	9.12	14.27	10.95			
Girls	17	$\bar{X}$	60.71	75.18	84.18	14.47	23.47	9.00
		S	9.10	10.33	10.85			
Total	34	$\bar{X}$	61.26	77.21	84.15	15.95	27.89	6.94
		S	8.99	12.44	10.73			
WIC with one year PLDK								
Boys	17	$\bar{X}$	63.88	81.06	91.65	17.18	27.77	10.59
		S	8.47	12.12	13.22			
Girls	17	$\bar{X}$	63.76	79.53	94.35	15.77	30.59	14.82
		S	9.56	9.78	12.08			
Total	34	$\bar{X}$	63.82	80.29	93.00	16.47	29.18	12.71
		S	8.89	10.87	12.54			
WIC with two years PLDK								
Boys	17	$\bar{X}$	63.00	84.94	91.88	21.94	28.88	6.94
		S	8.16	8.00	11.43			
Girls	17	$\bar{X}$	65.71	82.88	90.82	17.17	25.11	7.94
		S	9.40	12.77	12.20			
Total	34	$\bar{X}$	64.35	83.91	91.35	19.56	27.00	7.44
		S	8.78	10.55	11.65			
SCRP without PLDK								
Boys	14	$\bar{X}$	60.64	83.36	89.07	22.72	28.43	5.71
		S	5.65	9.09	8.81			
Girls	14	$\bar{X}$	65.50	86.07	90.36	20.57	24.86	4.29
		S	7.06	11.85	10.65			
Total	28	$\bar{X}$	63.07	84.71	89.71	21.64	26.64	5.00
		S	6.74	10.46	9.61			
SCRP with one year PLDK								
Boys	14	$\bar{X}$	63.29	83.14	89.29	19.85	26.00	6.15
		S	7.98	10.44	12.77			
Girls	14	$\bar{X}$	65.29	86.43	92.21	21.14	26.92	5.78
		S	6.74	11.09	12.81			
Total	28	$\bar{X}$	64.29	84.79	90.75	20.50	26.46	5.96
		S	7.32	10.70	12.64			
SCRP with two years PLDK								
Boys	14	$\bar{X}$	64.93	86.57	96.79	21.64	31.86	10.22
		S	8.78	10.46	11.17			
Girls	14	$\bar{X}$	61.43	82.07	89.36	20.64	27.93	7.29
		S	7.80	10.79	11.08			
Total	28	$\bar{X}$	63.18	84.32	93.07	21.14	29.89	8.75
		S	8.34	10.68	11.56			
Experimental Reading Totals								
ITA	120	$\bar{X}$	61.73	79.21	88.68	17.48	26.95	9.47
		S	8.45	11.02	12.79			
WIC	102	$\bar{X}$	63.15	80.47	89.50	17.32	26.35	9.03
		S	8.90	11.54	12.18			
SCRP	84	$\bar{X}$	63.51	84.61	91.18	21.10	27.67	6.57
		S	7.43	10.48	11.29			
Experimental PLDK Totals								
Without PLDK (W/0)	102	$\bar{X}$	62.53	80.34	88.65	17.81	26.12	8.31
		S	7.87	11.71	11.53			
With one year PLDK (W/1)	102	$\bar{X}$	62.66	81.23	90.59	18.57	27.93	9.36
		S	8.77	11.62	13.29			
With two years PLDK (W/2)	102	$\bar{X}$	62.89	81.76	89.69	18.87	26.80	7.93
		S	8.47	10.40	11.72			
Grand Experimental Total								
Boys	153	$\bar{X}$	62.34	81.95	90.31	19.61	27.97	8.36
		S	8.10	10.91	12.06			
Girls	153	$\bar{X}$	63.05	80.27	88.97	17.22	25.92	8.70
		S	8.61	11.53	12.33			
Total	306	$\bar{X}$	62.69	81.11	89.64	18.42	26.95	8.53
		S	8.35	11.24	12.19			

[a] Posttest minus pretest IQ.
[b] Follow-up test minus pretest IQ.
[c] Follow-up test minus posttest IQ.

being for the W/1 group, the next being 26.80 for the W/2 group, and the least being 26.12 for the W/O group. In terms of experimental reading totals, the SCRP gained the most with 27.67, the ITA next with 26.95, and the WIC least with 26.35 months. In terms of sex differences, girls gained only 25.92 while the boys gained 27.97 months.

The analysis of variance data on these LA scores appears in Table 6. There was not a significant main effect on the PLDK variable. However, there was a main effect difference on the "reading method" dimension. The t-test breakdown revealed the SCRP group superior to the WIC and ITA groups.

There was no significant main effect on the sex dimension.

On the "Test Years" variable, there was a significant main effect. The children, as a total experimental group, gained significantly in LA from pre- to post-testing, and from post- to followup testing. A larger LA gain occurred between pre- to post-testing, than from post- to follow-up testing--which was anticipated since two years growth was being compared with one year of growth.

There were a number of interactions which were statistically significant, but probably educationally unimportant. There were significant PLDK by Reading Method (B x C), Test Years by Reading Method (A x C), Test Years by Sex (A x D), and a significant Test Years by PLDK treatment by Reading Method triple interaction (A x B x C). All but the A x D interaction are explained by this triple interaction.

Upon posttesting, the WIC and SCRP groups attained slightly greater LA gains than the ITA group in combination with two years of PLDK exercises. Similarly, the WIC and SCRP with two years of PLDK exercises (W/2)

Table 6

Analysis of Variance on LA Scores of the Illinois Test of Psycholinguistic Abilities Pretest, Posttest, and Follow-up Scores

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
Between Subjects	305	80494.9000	263.9180		
B (PLDK)	2	189.1000	94.5500	0.3653	2.30
C (Reading Method)	2	1546.4000	773.2000	2.9870*	2.30
D (Sex)	1	134.7000	134.7000	0.5204	2.71
B x C	4	2383.7000	595.9250	2.3022*	1.94
B x D	2	114.2000	57.1000	0.2206	2.30
C x D	2	134.3000	67.1500	0.2594	2.30
B x C x D	4	1442.2000	360.5500	1.3929	1.94
Error (b)	288	74550.3000	258.8550		
Within Subjects	612	140703.7000	229.9080		
A (Test Years)	2	116092.6000	58046.3000	1494.9349***	2.30
A x B	4	115.1000	28.7750	0.7411	1.94
A x C	4	455.0000	113.7500	2.9295**	1.94
A x D	2	253.3000	126.6500	3.2618**	2.30
A x B x C	8	868.6000	108.5750	2.7963***	1.67
A x B x D	4	149.0000	37.2500	0.9593	1.94
A x C x D	4	198.3000	49.5750	1.2768	1.94
A x B x C x D	8	206.5000	25.8130	0.6648	1.67
Error (w)	576	22365.3000	38.8290		
Total	917	221198.6000	241.2200		

*p <.10
**p <.05
***p <.01

made greater LA gains from pre- to followup testing than the ITA group with two years of such lessons (W/2). However, the ITA and SCRP groups made greater LA gains than the WIC group from pre- to followup testing only among children who did not receive the PLDK exercises. The WIC with two years of PLDK exercises made greater progress than the WIC without PLDK exercises (W/O) from pre- to post-testing, as well as from pretest to followup evaluation. However, the ITA without PLDK exervises (W/O) made greater gains than the ITA group with two years of PLDK lessons.

The following conclusions are drawn from the language age scores on the ITPA:

a) Generally, the PLDK lessons did not prove effective in raising LA scores on the ITPA.

b) Overall, the SCRP children gained more in language age than either the WIC or the ITA treatment groups.

c) There were no differences, overall, between boys and girls on language age gains.

3) Creative Thinking. Followup scores on the total verbal subtests of the Torrance Tests of Creative Thinking are reported in Table 7. Examination of the mean raw score values in Table 7 will reveal a gradual increment in mean values from 73.62 for the children in experimental reading programs without PLDK (W/O), to 84.27 for those with one year of PLDK (W/1), to 86.72 for those with two years of PLDK (W/2). In terms of the reading treatments the SCRP group was the highest with a mean of 85.88, ITA second with a mean of 85.40, and WIC with a mean of 72.59. The girls were slightly higher than the boys 81.77 vs. 81.30). The question remains: which, if any, of the differences were statistically significant?

Table 7

Means and Standard Deviations on Total Verbal Subtest Scores of the Torrance Tests of Creativity

Treatment Group	N	$\bar{X}$	S
ITA without PLDK			
Boys	20	74.10	29.13
Girls	20	77.65	32.87
Total	40	75.88	30.70
ITA with one year PLDK			
Boys	20	88.95	23.67
Girls	20	92.05	26.98
Total	40	90.50	25.10
ITA with two years PLDK			
Boys	20	86.95	28.09
Girls	20	92.70	38.46
Total	40	89.82	33.37
WIC without PLDK			
Boys	17	76.53	20.50
Girls	17	58.35	19.90
Total	34	67.44	21.93
WIC with one year PLDK			
Boys	17	71.88	15.93
Girls	17	79.82	27.75
Total	34	75.85	22.64
WIC with two years PLDK			
Boys	17	67.29	27.61
Girls	17	81.65	23.07
Total	34	74.47	26.09
SCRP without PLDK			
Boys	14	83.86	17.95
Girls	14	71.93	27.14
Total	28	77.89	23.38
SCRP with one year PLDK			
Boys	14	89.93	22.30
Girls	14	81.29	30.58
Total	28	85.61	26.63
SCRP with two years PLDK			
Boys	14	95.64	42.58
Girls	14	98.64	31.57
Total	28	97.14	36.82
Experimental Reading Totals			
ITA	120	85.40	30.43
WIC	102	72.59	23.68
SCRP	84	86.88	30.21
Experimental PLDK Totals			
Without PLDK	102	73.62	26.21
With one year PLDK	102	84.27	25.30
With two years PLDK	102	86.72	33.15
Grand Experimental Total			
Boys	153	81.30	27.03
Girls	153	81.77	30.77
Total	306	81.54	28.91

Analysis of variance data of the Torrance Tests appear in Table 8. Significant main effects were obtained on levels of PLDK, as well as on methods of teaching beginning reading, but not on the sex dimension. There were no significant interactions. The t-test breakdown on levels of PLDK treatment revealed that both the W/1 and W/2 PLDK groups were significantly superior to the W/O PLDK group, but no significant difference was obtained between W/1 and W/2. In terms of the reading treatments, ITA and SCRP were superior to WIC, but no significant difference was found between the ITA and SCRP groups.

The following conclusions are drawn for the analyses of the total verbal subtests scores on the Torrance Tests of Creative Thinking:

a) One or two years of PLDK exercises resulted in higher verbal performance on the Torrance Tests of Creative Thinking than no PLDK training.

b) One year of PLDK exercises was as effective as two years in stimulating verbal creativity scores.

c) Both the ITA and SCRP groups were superior to the WIC group in creativity scores, with no explanation proposed for this unanticipated result except that of teacher and/or pupil selection.

4) School Achievement. Grade equivalent scores on the Metropolitan Achievement Tests (MAT) are presented in Table 9 and raw scores in Table 10. The scores were derived from the five written language subtests: a) Word Knowledge, b) Word Discrimination, c) Reading Comprehension, d) Spelling, and e) Language. The total score was obtained by averaging these five subtests together. Examination of Table 9 will reveal that,

Table 8

Analysis of Variance on Total Verbal Subtest Scores

of the Torrance Tests of Creative Thinking

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	9896.9000	4948.4500	6.3826*	2.30
B (Reading Methods)	2	12357.7000	6178.8500	7.9695*	2.30
C (Sex)	1	17.0000	17.0000	0.0219	2.71
A x B	4	2195.3000	548.8250	0.7079	1.94
A x C	2	3224.1000	1612.0500	2.0792	2.30
B x C	2	1263.9000	631.9500	0.8151	2.30
A x B x C	4	2724.8000	681.2000	0.8786	1.94
Error	288	223288.5000	775.3070		
Total	305	254968.2000			

*p < .01

on the average, the 306 experimental subjects were achieving at the 2.67 grade level in March or April of their second year in school, and had only increased to 2.77 during their third year in school. (This small increment of 0.10 of a grade in a full year is alarming. Even though the mean pre-test IQ of the group was only 87.10 (see Table 3), much more progress than this could be anticipated. If the MAT data are valid and reliable, this is sad commentary on the third grade teachers. However, it must be pointed out that the Primary II Battery was given after the second grade, and the Elementary Battery after the third grade. (This latter battery may

have been too advanced for these pupils, or the standardization may have been enough different to make the small increment an artifact of the different test batteries.) Children in the experimental reading programs without PLDK were achieving, on the average, at the 2.77 grade level at posttesting, and at the 2.90 grade level at time of the followup evaluation. The W/1 group were at the 2.50 grade level at posttesting and 2.70 at followup. The W/2 group were at 2.73 posttesting and 2.71 at followup. In terms of the experimental reading groups, the ITA group was at the 2.61 grade level at posttesting and 2.75 at followup. The WIC group were at 2.49 at posttesting and 2.71 at followup. The SCRP group were at 2.96 at posttesting and 2.87 at followup. (Also included in Table 9 and 10 are descriptive data on the control group, even though these data were not included in the analyses of variance.)

The analysis of variance statistics on the followup data are reported in Table 11 for total written language raw scores. The findings had changed from last year when the SCRP reading group was superior to both the ITA and WIC groups (see pages 20 - 23). At time of followup, no significant main effect difference remained across experimental reading treatments. (The descriptive data in Table 9 reveal that the SCRP group slipped from a grade equivalent of 2.96 to 2.87 at time of followup, while both the ITA and WIC groups made slight gains.) Furthermore, there were no significant differences across PLDK treatments. As expected, the girls were achieving significantly above the boys. The significant PLDK by sex interaction was due primarily to the girls in the W/O group achieving significantly above those in the W/1 and W/2 groups. Finally, the girls were only significantly superior to the boys within the W/O

Table 9

Grade Equivalent Means and Standard Deviations [illegible] Language Subtests and Total Written Language Scores of the [illegible] Tests

Treatment Group	N		Total Post	Total Follow-up	Total Diff.	WR Post	WR Follow-up	WR Diff.	[illegible] Post	[illegible] Follow-up	[illegible] Diff.	[illegible] Post	[illegible] Follow-up	[illegible] Diff.	[illegible] Post	[illegible] Follow-up	[illegible] Diff.	L[1] Follow-up
ITA without PLM																		
Boys	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	40	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
ITA with one year PLM																		
Boys	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	40	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
ITA with two years PLM																		
Boys	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	20	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	40	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
WIC without PLM																		
Boys	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	34	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
WIC with one year PLM																		
Boys	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	34	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
WIC with two years PLM																		
Boys	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	17	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	34	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
SCWP without PLM																		
Boys	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	28	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
SCWP with one year PLM																		
Boys	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	28	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
SCWP with two years PLM																		
Boys	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	14	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	28	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Experimental Reading Totals																		
ITA	120	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
WIC	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
SCWP	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Experimental PLM Totals																		
Without PLM	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
With one year PLM	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
With two years PLM	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Grand Experimental Totals																		
Boys	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Controls																		
Boys	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Girls	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]
Total	[illegible]	$\bar{X}$	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		S	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]

[1]There are no posttest "Language" subtest scores because that subtest is not [illegible]

Table 10

Raw Score Means and Standard Deviations on Written Language Subtests and Total Written Language Raw Scores of the Metropolitan Achievement Tests

Treatment Group	N	Total		WR		WD		S		S		L	
		$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s	$\bar{X}$	s
ITA without PLEK													
Boys	20	12.53	5.11	14.35	8.24	11.85	8.67	10.90	4.54	9.15	7.60	16.60	6.42
Girls	20	17.76	7.77	17.25	7.94	14.60	8.01	18.90	5.56	17.20	10.15	22.85	12.08
Total	40	15.14	7.01	15.70	7.77	13.22	7.41	13.90	5.86	13.18	9.75	19.72	10.06
ITA with one year PLEK													
Boys	20	15.42	8.72	16.10	10.85	14 05	8.35	14.70	5.09	13.60	13.10	18.65	9.49
Girls	20	13.31	9.73	13.45	10.21	12.35	9.02	12.50	7.61	11.15	14.11	17.10	11.25
Total	40	14.36	9.18	14.78	10.48	13.20	9.04	13.60	6.92	12.38	13.49	17.84	10.30
ITA with two years PLEK													
Boys	20	12.78	8.74	14.60	10.96	11.60	8.82	12.30	6.18	10.70	10.78	14.70	9.32
Girls	20	15.29	5.74	16.10	8.84	12.65	6.41	14.50	5.61	12.00	9.68	21.20	7.23
Total	40	14.04	7.41	15.35	9.05	12.12	7.83	13.40	7.01	11.35	9.86	17.95	8.87
WIC without PLEK													
Boys	17	10.86	6.39	11.06	7.96	7.76	8.40	9.53	4.90	7.59	8.25	18.35	8.71
Girls	17	17.35	7.13	14.82	9.08	17.18	8.49	14.47	4.29	18.88	13.40	21.29	7.54
Total	34	14.09	7.43	12.94	8.83	12.47	7.94	12.00	5.18	13.24	12.37	19.82	8.17
WIC with one year PLEK													
Boys	17	11.58	8.61	13.47	10.77	10.59	8.97	10.47	8.23	9.59	12.83	13.71	8.18
Girls	17	17.88	6.18	17.35	7.79	15.53	8.80	15.29	5.10	16.88	11.42	22.24	6.31
Total	34	14.71	8.15	15.41	9.48	13.06	8.23	12.88	7.17	14.24	12.85	17.97	8.39
WIC with two years PLEK													
Boys	17	13.13	8.97	14.88	9.05	11.41	6.60	11.06	6.61	10.78	10.39	17.53	9.70
Girls	17	14.76	5.83	14.12	8.56	14.12	8.09	12.47	9.05	14.82	9.99	18.29	7.54
Total	34	13.95	8.38	14.50	7.79	12.76	8.40	11.76	9.84	12.79	10.24	17.91	8.56
SCHP without PLEK													
Boys	14	16.21	8.35	19.21	11.71	14.36	8.97	13.86	6.50	17.50	12.68	18.64	6.28
Girls	14	21.49	7.39	22.21	8.78	19.21	5.71	19.86	8.18	22.43	10.91	23.71	9.02
Total	28	18.10	8.11	20.71	10.28	16.79	7.78	16.86	6.93	19.96	11.90	21.18	8.05
SCHP with one year PLEK													
Boys	14	11.63	8.87	14.07	10.62	10.79	8.00	10.43	8.94	9.93	10.98	12.93	8.87
Girls	14	13.84	8.04	14.50	7.74	12.50	5.08	11.29	4.44	13.21	9.92	17.71	9.04
Total	28	12.74	7.08	14.29	9.12	11.64	6.83	10.86	5.73	11.57	10.39	15.32	9.12
SCHP with two years PLEK													
Boys	14	16.19	8.28	19.14	7.82	14.79	7.17	11.71	5.38	17.57	11.41	17.71	4.53
Girls	14	13.93	5.36	14.00	8.01	12.29	5.33	11.07	2.79	17.11	10.33	15.07	8.48
Total	28	15.06	5.84	16.57	8.20	13.54	6.33	11.39	4.22	17.39	10.68	16.39	5.64
Experimental Reading Totals													
ITA	120	14.52	7.87	15.28	8.95	12.85	8.01	13.03	6.56	12.30	11.16	18.52	9.72
WIC	102	14.25	7.29	14.28	8.83	12.76	7.50	12.22	6.08	13.42	11.77	18.57	8.34
SCHP	84	15.63	7.51	17.19	9.51	13.99	7.18	13.04	6.29	16.31	11.44	17.63	8.67
Experimental PLEK Totals													
Without PLEK	303	13.88	7.69	16.16	9.85	13.95	7.82	18.08	8.29	15.06	11.56	20.16	8.87
With one year PLEK	102	14.83	8.27	14.85	9.78	12.73	8.12	12.81	6.73	12.77	12.42	17.21	9.36
With two years PLEK	102	14.29	6.82	15.40	8.37	12.73	6.85	12.30	5.97	13.89	10.47	17.51	7.95
Grand Experimental Total													
Boys	153	13.35	7.87	15.04	9.71	11.86	7.89	11.70	8.51	11.59	11.1	16.55	8.26
Girls	153	18.12	7.24	15.90	8.34	14.41	7.12	14.25	5.98	15.95	11.45	20.83	9.84
Total	306	16.73	7.58	15.47	9.04	13.13	7.61	13.06	6.34	13.77	12.56	18.29	8.82
Controls													
Boys	24	10.65	7.55	11.17	9.30	8.88	7.82	10.71	7.24	5.83	8.28	18.67	8.81
Girls	24	14.78	6.51	15.08	7.82	13.79	6.06	13.75	5.81	12.96	10.81	18.33	9.84
Total	48	12.71	7.28	13.13	8.39	11.33	7.35	12.23	6.59	9.40	10.09	17.50	8.87

Table 11

Analysis of Variance on Total Follow-up Written Language Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	5114.3000	2557.1500	1.9040	2.30
B (Reading Methods)	2	2428.3000	1214.1500	0.9040	2.30
C (Sex)	1	14659.9000	14659.9000	10.9152**	2.71
A x B	4	10337.4000	2584.3500	1.9242	1.94
A x C	2	7525.5000	3762.7500	2.8016*	2.30
B x C	2	3973.8000	1986.9000	1.4794	2.30
A x B x C	4	6984.4000	1746.1000	1.3001	1.94
Error	288	386804.5000	1343.0710		
Total	305	437828.1000			

*p <.10
**p <.01

group, suggesting mildly that the PLDK is an equalizer to bring the boys up to the girls' standards.

In Tables 12 through 16 are the analyses of variance statistics for each of the five written language subtests of the MAT. In light of the inconsequential overall written language gains made by the subjects in each of the groups during their third year in school (see Table 9), the results of these subtests will not be discussed in detail. However, the tables are included in the report for those who may wish to give them

Table 12

Analysis of Variance on the Follow-up Word Knowledge Subtests

Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	87.4300	43.7150	0.5440	2.30
B (Reading Methods)	2	396.6030	198.3020	2.4677*	2.30
C (Sex)	1	56.9410	56.9410	0.7086	2.71
A x B	4	630.8210	157.7050	1.9625*	1.94
A x C	2	252.9580	126.4790	1.5739	2.30
B x C	2	96.7950	48.3980	0.6023	2.30
A x B x C	4	285.1220	71.2810	0.8870	1.94
Error	288	23143.5720	80.3600		
Total	305	24950.2360			

*p <.10

more intensive study. The main subtest results are discussed briefly below:

a) Significant differences among PLDK groups were obtained on two of the five subtests, namely, Reading Comprehension and Language. The differences on both subtests resulted from the superior performance of the non-PLDK group in comparison to those with one and two years of PLDK.

b) Significant differences among the experimental reading treatments were obtained on two of the five subtests, namely Word Knowledge and Spelling. On both the Word Knowledge and Spelling Subtests, the SCRP

Table 13

Analysis of Variance on the Follow-up Word Discrimination Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	102.1240	51.0620	0.9308	2.30
B (Reading Methods)	2	84.8650	42.4330	0.7735	2.30
C (Sex)	1	494.5130	494.5130	9.0147**	2.71
A x B	4	314.1860	78.5470	1.4319	1.94
A x C	2	354.3940	177.1970	3.2302*	2.30
B x C	2	383.3740	191.6870	3.4943*	2.30
A x B x C	4	135.4380	33.8600	0.6172	1.94
Error	288	15798.6140	54.8560		
Total	305	17667.5070			

*p <.05
**p <.01

group was superior to both the ITA and WIC groups, but no significant differences were obtained between the latter two groups.

c) Significant differences between boys and girls were obtained on four out of five subtests. The girls obtained higher scores than the boys on all the MAT Subtests with the exception of Word Knowledge. These data support the repeatedly discovered finding that girls do better than boys in school achievement in the elementary grades.

d) Significant interactions between Sex and Experimental Reading

Table 14

Analysis of Variance on the Follow-up Reading Comprehension Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	183.7310	91.8660	2.5545*	2.30
B (Reading Methods)	2	110.9820	55.4910	1.5431	2.30
C (Sex)	1	515.0620	515.0620	14.3226***	2.71
A x B	4	462.2990	115.5750	3.2138**	1.94
A x C	2	356.7490	178.3750	4.9601***	2.30
B x C	2	48.9650	24.4830	0.6808	2.30
A x B x C	4	218.2910	54.5730	1.5175	1.94
Error	288	10356.9200	35.9620		
Total	305	12252.9970			

*p <.10
**p <.05
***p <.01

Methods were obtained on the Word Discrimination and Spelling Subtests. In both cases, boys achieved better under SCRP than under WIC, with a trend for SCRP to be superior also to ITA, while ITA was superior to WIC. For girls, there was a trend for WIC to be better than ITA.

e) Significant PLDK by Sex interactions were obtained on the Word Discrimination, Reading, and Spelling Subtests. For girls only, W/0 was superior to both W/1 and W/2; the W/1 and W/2 groups were approximately equal.

Table 15

Analysis of Variance on the Follow-up Spelling Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	278.4890	139.2450	1.1313	2.30
B (Reading Methods)	2	813.4160	406.7080	3.3045**	2.30
C (Sex)	1	1453.8860	1453.8860	11.8127***	2.71
A x B	4	860.9890	215.2470	1.7489	1.94
A x C	2	606.9850	303.4930	2.4658*	2.30
B x C	2	570.0480	285.0240	2.3158*	2.30
A x B x C	4	299.0370	74.7590	0.6074	1.94
Error	288	35446.5990	123.0780		
Total	305	40329.4420			

*p <.10
**p <.05
***p <.01

f) Significant reading methods by PLDK interactions were obtained on the Word Knowledge and Reading Subtests. Analyses of the interactions indicated that the SCRP reading group was significantly superior to the ITA and WIC groups only among children who did not receive PLDK. Moreover, among children who were taught to read by the SCRP approach, those without PLDK experience were significantly superior to those with one and two years of PLDK.

Table 16

Analysis of Variance on the Follow-up Language Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	537.4600	268.7300	3.6804*	2.30
B (Reading Methods)	2	50.5700	25.2850	0.3463	2.30
C (Sex)	1	928.4000	928.4000	12.7151**	2.71
A x B	4	175.2900	43.8230	0.6002	1.94
A x C	2	96.2300	48.1150	0.6590	2.30
B x C	2	35.3300	17.6650	0.2419	2.30
A x B x C	4	863.3200	215.8300	2.9559*	1.94
Error	288	21028.5200	73.0160		
Total	305	23715.1200			

*p <.05
**p <.01

g) A significant PLDK by Reading Method by Sex interaction was obtained on the Language Subtest. Girls were superior to boys in ITA W/0, ITA W/2, and WIC W/1. For boys in the W/1 group, there was a trend for the ITA approach to be superior to both the WIC and SCRP methods. Furthermore, the girls in the ITA W/2 group were superior to girls in the SCRP W/2 group. Finally, the ITA W/0 girls were significantly superior to the ITA W/1 girls, while the SCRP W/0 girls were superior to the SCRP W/2 girls. The conflicting nature of these findings precludes the drawing of unambiguous conclusions.

Before concluding this section of the report, some dats on teacher variability are introduced in Table 17. The information provided is mean grade equivalent post and followup scores on the Total Written Language Subtests of the Metropolitan Achievement Tests, as well as initial IQ scores, by "Treatment Groups," "Initial School Placements" and "Initial Teachers." It is interesting to compare these mean values with those found in Table 9. Generally, there is as much or more variability among teachers as among experimental reading treatment groups. Therefore, it is not surprising that equivocal and generally negative results were found on the experimental variables. Some teachers were apparently so incompetent that the intervention did not have a chance to demonstrate its effectiveness. The all-too-rare teacher (see Teacher #21 in Table 17) was outstanding. In fact, this particular teacher may have been what tipped the balance in favor of the SCRP group at time of posttesting. It is interesting to note that three ITA teachers, zero WIC teachers, and five SCRP teachers had their children, on the average, about the third grade level at posttesting. By the time of followup testing, the children from only two ITA teachers, zero WIC teachers, and one SCRP teacher were achieving, on the average, above the third grade level in written language. Because of these findings, the researchers in this investigation were forced to conclude that, without controlling for differences in teacher effectiveness, future research which attempts to discern the relative effectiveness of different methods of teaching beginning reading and/or oral language probably will be futile, or the results will be spurious. Either such comparisons of educational interventions should be tabled until more is known about controlling for the

Table 17

Mean Grade Equivalent Post and Follow-up Scores on the Total Written Language Subtests of the Metropolitan Achievement Tests and Initial IQ Scores by Treatment Groups, Initial School Placements and Initial Teachers

Treatment Group	Teacher Number	IQ	MAT Grade Equivalents Post	Follow-up
ITA without PLDK (W/O)				
School A	1	92.82	1.82	2.30
School B	2	85.50	3.18	2.99
School C	3	87.69	2.94	3.05
ITA with one year PLDK (W/1)				
School A	4	90.08	2.67	3.11
School C	5	80.53	2.13	2.44
School C	6	79.36	2.43	2.80
ITA with two years PLDK (W/2)				
School B	7	88.44	3.16	2.90
School B	8	84.06	2.91	2.66
School C	9	90.47	2.38	2.58
WIC without PLDK (W/O)				
School D	10	86.00	2.62	2.76
School E	11	84.27	2.27	2.57
School F	12	82.08	2.50	2.77
WIC with one year PLDK (W/1)				
School D	13	96.00	2.02	2.28
School E	14	87.26	2.56	2.98
School F	15	86.00	2.81	2.68
WIC with two years PLDK (W/2)				
School D	16	86.77	2.47	2.65
School E	17	86.89	2.42	2.86
School F	18	85.83	2.41	2.60
SCRP without PLDK (W/O)				
School G	19	89.67	3.16	2.76
School H	20	84.80	2.16	2.67
School I	21	90.94	3.67	3.64
SCRP with one year PLDK (W/1)				
School G	22	86.42	3.01	2.82
School H	23	87.27	2.28	2.39
School J	24	91.60	2.26	2.36
SCRP with two years PLDK (W/2)				
School G	25	85.33	3.00	2.75
School H	26	90.20	3.18	2.80
School H	27	92.50	2.85	2.76

teacher variable by selecting only adequate teachers or by covariance or some such statistical technique, or research designs should be utilized in which the teacher is kept constant across treatment. This might necessitate the use of some type of counter-balanced design in which a group of teachers would use one method for one or more years, and these same teachers a different method with comparable children for another one or more years. Another method would be for the same teachers to try out two or more new approaches concurrently, by teaching one procedure in the morning and another in the afternoon of the same day, and then reversing the order the next day. (We contemplated deleting from the experiment teachers rated as "poor" and "excellent" when analyzing our data, but did not have a sufficient subject pool to enable us to do this--see page 13 for the procedures used to rate the teachers.)

The following conclusions are drawn from the MAT data:

a) Upon the termination of the two year experimental period, the SCRP experimental reading approach was superior to the ITA and WIC approaches when measured by overall written language achievement. However, at time of followup, no significant difference remained in favor of the SCRP group. In fact, during their third year in school, the SCRP group actually declined in school achievement. This decrement suggests that more effective teaching by the SCRP teachers during the initial two-year experimental period may have accounted for the earlier initial advantage of this treatment.

b) As anticipated, girls achieved generally at a significantly higher level than boys in the written language subtests of the Metropolitan Achievement Tests, regardless of experimental reading approach they received.

c) There was some slight evidence to indicate that the PLDK lessons tended to equalize school achievement for boys in contrast to girls. In short, there was an indication that boys are more in need of the PLDK exercises than girls.

d) The variability in pupil progress among teachers within the various experimental reading programs was as great as among the experimental reading programs themselves, suggesting that some greater control of the teacher variable than was the case in this study is required when investigating the relative effectiveness of different educational interventions.

5) Written Language Development. Data on the written language development which was obtained from Myklebust's Written Picture Story Language Test appear in Table 18. The task for each subject was to write a creative story stimulated by the standard picture provided in the test kit. The means in Table 18 indicate that, among the PLDK treatment groups, the W/O children were superior to children in the other two groups (W/1 and W/2). Furthermore, among the experimental reading approaches, the ITA group tended to be superior to the other two reading groups on two related measures of productivity (total words and total sentences written), as well as on the degree of abstraction, but these differences did not reach statistical significance. The SCRP group was superior to the other groups in words per sentence. The WIC group was inferior on all measures.

The analyses of variance for the five measures on Myklebust's Written Picture Story Language Test appear in Tables 19 through 23. The results from these analyses are discussed below:

Table 18

Means and Standard Deviations of Scores on Myklebust's Written Picture Story Language Test

Treatment Group	N	Productivity: Total Words $\bar{X}$	Total Words S	Total Sentences $\bar{X}$	Total Sentences S	Words per Sentence $\bar{X}$	Words per Sentence S	Syntax Quotient $\bar{X}$	Syntax Quotient S	Degree of Abstraction $\bar{X}$	Degree of Abstraction S
ITA without PLDK											
Boys	20	66.15	52.56	8.75	4.82	7.78	2.91	86.97	6.49	9.40	5.09
Girls	20	75.50	42.93	9.20	4.29	7.98	2.18	89.08	6.68	9.90	3.93
Total	40	70.82	47.60	8.98	4.51	7.88	2.54	88.02	6.59	9.65	4.50
ITA with one year PLDK											
Boys	20	57.10	33.95	7.80	4.62	7.64	1.88	83.27	20.56	8.60	4.12
Girls	20	55.25	44.24	7.55	5.03	6.24	3.25	69.33	36.54	7.30	5.82
Total	40	56.18	38.93	7.68	4.77	6.94	2.71	76.30	30.10	7.95	5.02
ITA with two years PLDK											
Boys	20	90.95	84.82	11.05	9.39	7.45	3.55	73.72	32.98	10.80	7.63
Girls	20	74.95	48.99	9.50	5.78	7.39	2.19	84.60	10.69	9.80	4.71
Total	40	82.95	68.85	10.28	7.74	7.42	2.91	79.16	24.82	10.30	6.28
WIC without PLDK											
Boys	17	52.12	35.87	6.29	3.46	6.88	3.43	69.94	34.51	7.76	6.41
Girls	17	69.18	37.41	9.29	5.23	7.92	2.49	88.21	9.59	9.88	4.26
Total	34	60.65	37.11	7.79	4.62	7.40	3.00	79.07	26.61	8.82	5.46
WIC with one year PLDK											
Boys	17	55.70	39.15	7.71	5.42	5.71	3.36	62.01	41.98	6.94	7.05
Girls	17	65.71	25.95	8.29	3.41	8.41	2.23	85.08	11.46	10.35	3.97
Total	34	60.71	33.10	8.00	4.47	7.06	3.12	73.54	32.48	8.65	5.89
WIC with two years PLDK											
Boys	17	42.06	28.26	6.29	4.73	6.76	2.35	81.49	23.27	6.82	3.66
Girls	17	63.53	37.34	8.76	5.18	6.48	2.69	83.91	23.05	9.71	5.75
Total	34	52.79	34.38	7.53	5.04	6.62	2.49	82.70	22.84	8.26	4.97
SCRP without PLDK											
Boys	14	67.29	42.37	7.86	4.55	8.41	3.74	83.14	24.71	9.00	4.69
Girls	14	93.79	35.94	10.43	4.94	8.77	3.56	90.41	7.56	11.36	4.77
Total	28	80.54	40.85	9.14	4.84	8.59	3.59	86.78	18.31	10.18	4.79
SCRP with one year PLDK											
Boys	14	42.86	24.59	6.07	3.36	5.56	2.81	68.21	37.69	6.50	4.55
Girls	14	61.00	26.74	8.50	4.24	7.06	2.62	81.08	24.17	8.71	4.94
Total	28	51.93	26.84	7.29	3.95	6.31	2.78	74.65	31.75	7.61	4.79
SCRP with two years PLDK											
Boys	14	72.29	42.85	9.43	5.52	7.86	1.59	87.20	6.72	8.50	4.70
Girls	14	60.50	40.56	8.14	4.94	7.04	2.85	83.89	25.05	7.43	4.67
Total	28	66.39	41.38	8.79	5.18	7.45	2.30	85.54	18.07	7.96	4.63
Experimental Reading Totals											
ITA	120	69.98	53.98	8.98	5.90	7.41	2.73	81.16	23.20	9.30	5.37
WIC	102	58.05	34.76	7.77	4.67	7.03	2.87	78.44	27.58	8.58	5.41
SCRP	84	66.29	38.37	8.40	4.70	7.45	3.05	82.32	23.94	8.58	4.82
Experimental PLDK Totals											
Without PLDK	102	70.10	42.80	8.63	4.63	7.91	3.01	84.70	18.81	9.52	4.90
With One Year PLDK	102	56.52	33.88	7.68	4.42	6.81	2.86	74.93	31.07	8.09	5.24
With Two Years PLDK	102	68.35	53.30	8.95	6.32	7.16	2.62	82.09	22.41	8.98	5.49
Grand Experimental Total											
Boys	153	61.35	46.51	8.00	5.58	7.13	2.99	77.43	28.50	8.35	5.56
Girls	153	68.63	39.51	8.84	4.79	7.45	2.73	83.71	20.32	9.37	4.84
Total	306	64.99	44.31	8.42	5.21	7.29	2.86	80.57	24.91	8.86	5.23

Table 19

Analysis of Variance of Total Words on Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	11133.2000	5566.6000	2.9430*	2.30
B (Reading Methods)	2	8047.1000	4023.5500	2.1272	2.30
C (Sex)	1	4062.8000	4062.8000	2.1479	2.71
A x B	4	16113.2000	4028.3000	2.1297*	1.94
A x C	2	4596.6000	2298.3000	1.2151	2.30
B x C	2	5369.8000	2684.9000	1.4195	2.30
A x B x C	4	4873.4000	1218.3500	0.6441	1.94
Error	288	544752.9000	1891.5030		
Total	305	598949.0000			

*p <.10

a) On the PLDK dimension (A), there was a significant main effect on three of the five subtests. In two cases, the W/0 and W/2 groups were superior to the W/1 groups; in one case, the W/0 group was superior to the W/1 and W/2 groups (words per sentence).

b) In terms of the main effect on the experimental reading dimension, there was no significance on any of the five measures.

c) In terms of the main effect analyses on boys vs. girls, there were significant differences between the sexes on two of the five subtests, with girls superior to boys in both cases.

Table 20

Analysis of Variance of Total Sentences on Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	89.5360	44.7680	1.6661	2.30
B (Reading Methods)	2	79.4800	39.7400	1.4790	2.30
C (Sex)	1	53.5420	53.5420	1.9927	2.71
A x B	4	103.8280	25.9570	0.9660	1.94
A x C	2	52.2010	26.1010	0.9714	2.30
B x C	2	88.7330	44.3670	1.6512	2.30
A x B x C	4	62.6650	15.6660	0.5830	1.94
Error	288	7738.4730	26.8700		
Total	305	8268.4580			

d) There was one significant PLDK by reading method (A x B) interaction, namely on the total words measure. The ITA W/2 group was superior to the ITA W/1 group, as well as the WIC W/2 group. Furthermore, the SCRP W/O group was superior to the SCRP W/1 group.

e) There were two Reading Methods by Sex (B x C) interactions--for Syntax and Degree of Abstraction. In both cases the boys in ITA group were superior to the girls in ITA group. However, the girls in WIC group were superior to the boys in WIC group. Since no logical argument is known for how one experimental reading method could have a differential effect from another on the Myklebust Test,

Table 21

Analysis of Variance of Words Per Sentence Scores on Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	6518.9000	3259.4500	4.1229*	2.30
B (Reading Methods)	2	1100.5000	550.2500	0.6960	2.30
C (Sex)	1	765.5000	765.5000	0.9683	2.71
A x B	4	3554.1000	888.5250	1.1239	1.94
A x C	2	1740.1000	870.0500	1.1005	2.30
B x C	2	3406.3000	1703.1500	2.1543	2.30
A x B x C	4	5435.2000	1358.8000	1.7187	1.94
Error	288	227685.9000	790.5760		
Total	305	250206.5000			

*p <.05

one must conclude that these findings are due to a statistical artifact created by running multiple t-tests with a probability of getting 10 out of 100 significant due to chance, or to a bias in teacher and/or pupil selection.

There was one significant triple interaction across PLDK by Reading Method by Sex (A x B x C) for the Syntax area. The multiple t-test breakdown revealed that girls were superior to boys in WIC W/O and WIC W/1 groups. Between PLDK treatments, ITA W/O and W/2 girls tended to be superior to ITA W/1 girls. The WIC W/2 boys

Table 22

Analysis of Variance of Syntax Quotient Scores on Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	$F_{.90}$
A (PLDK)	2	522200.0000	261100.0000	4.4400**	2.30
B (Reading Methods)	2	76280.0000	38140.0000	0.6486	2.30
C (Sex)	1	301290.0000	301290.0000	5.1234**	2.71
A x B	4	170860.0000	42715.0000	0.7264	1.94
A x C	2	29860.0000	14930.0000	0.2539	2.30
B x C	2	307660.0000	153830.0000	2.6159*	2.30
A x B x C	4	579660.0000	144915.0000	2.4643**	1.94
Error	288	16936370.0000	58806.8400		
Total	305	18924180.0000			

*p <.10
**p <.05

were superior to the WIC W/1 boys. Furthermore, the SCRP W/O boys tended to be superior to the SCRP W/1 boys. Among reading groups, the ITA W/O and W/1 boys were superior to the WIC W/O and W/1 boys. The ITA W/1 girls were superior to the WIC W/1 girls. Again, the findings are inconsistent and inconclusive.

The following conclusions are drawn from the followup data on Myklebust's Written Picture Story Language Test analyses:

a) Little evidence was found to support the effectiveness of the PLDK lessons. As on other measures, the W/O group was generally

Table 23

Analysis of Variance of Abstract-Concrete Scores on Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	106.6080	53.3040	1.9793	2.30
B (Reading Methods)	2	37.7460	18.8730	0.7008	2.30
C (Sex)	1	79.5290	79.5290	2.9531*	2.71
A x B	4	125.4050	31.3510	1.1641	1.94
A x C	2	22.4880	11.2440	0.4175	2.30
B x C	2	160.3340	80.1670	2.9767*	2.30
A x B x C	4	55.9750	13.9940	0.5196	1.94
Error	288	7756.1510	26.9310		
Total	305	8344.2360			

*p <.10

superior to the group with one year of PLDK lessons (W/1).

b) As anticipated, the different experimental reading methods had no appreciable differential effect on the Myklebust test scores.

c) Girls were superior to boys on two of the five measures.

6) Oral Language Development. The Oral Picture Story Language Test was designed to parallel the Myklebust's Written Picture Story Language Test. Each subject was again presented with a picture and asked to generate a story, this time by telling it orally to the examiner, who in turn tape-recorded it. Measures of productivity and level of abstraction

were obtained. (There was no written story upon which to obtain a measure of grammatical correctness (syntax) which included punctuation, etc.)

The descriptive statistics on productivity (total words, total sentences, and words per sentence), and degree of abstraction (abstract-concrete) scores of the Oral Picture Story Language Test appear in Table 24. On all four measures, the girls were superior to the boys. In contrast to other results, on three of the four measures, the WIC group obtained slightly higher scores than both the ITA and SCRP groups. The W/1 PLDK group was somewhat higher than the W/O and W/2 PLDK groups--on three of the measures.

The analyses of variance data on the four measures appear in Tables 25 through 28. The results of these analyses are summarized below:

a) Significant differences among PLDK groups were obtained on words per sentence and degree of abstraction scores. On words per sentence, the W/1 PLDK group was significantly superior to the W/O group. The W/1 group was also superior in comparison to both the W/O and W/2 groups on degree of abstraction scores. The differences between reading treatments failed to reach statistical significance in all analyses.

b) Girls were significantly superior to the boys only on words per sentence (10.59 vs. 9.80).

c) Significant PLDK by reading method, and reading method by sex interactions were obtained on the words per sentence analysis. The t- test analyses of these interactions yielded a number of inconsistent results which failed to support the efficacy of any of

Table 24

Means and Standard Deviations on Scores of the Oral Picture Story Language Test

Treatment Group	N	Productivity: Total Words $\bar{X}$	Total Words S	Total Sentences $\bar{X}$	Total Sentences S	Words per Sentence $\bar{X}$	Words per Sentence S	Degree of Abstraction $\bar{X}$	Degree of Abstraction S
ITA without PLDK									
Boys	20	75.85	29.91	8.40	3.03	9.30	2.32	9.85	3.51
Girls	20	115.35	54.58	11.70	6.20	10.26	1.96	10.20	3.07
Total	40	95.60	47.82	10.05	5.10	9.78	2.18	10.02	3.26
ITA with one year PLDK									
Boys	20	92.00	35.77	9.80	3.50	9.46	2.00	10.60	3.63
Girls	20	99.50	52.29	9.15	5.80	11.01	2.70	10.95	3.85
Total	40	95.75	44.38	9.48	4.32	10.24	2.47	10.78	3.70
ITA with two years PLDK									
Boys	20	90.65	52.62	9.60	3.91	9.12	1.87	9.55	3.22
Girls	20	88.45	49.55	8.10	4.20	11.02	3.03	9.20	2.09
Total	40	89.55	50.46	8.85	4.08	10.07	2.66	9.38	2.69
WIC without PLDK									
Boys	17	78.18	42.25	8.18	3.81	9.36	1.94	8.53	2.58
Girls	17	94.71	95.32	9.76	8.73	9.24	1.91	8.53	2.24
Total	34	86.44	73.08	8.97	6.68	9.30	1.89	8.53	2.38
WIC with one year PLDK									
Boys	17	138.76	74.82	12.41	5.60	10.97	1.70	11.29	3.90
Girls	17	118.53	62.73	9.71	3.92	12.29	3.62	10.35	2.89
Total	34	128.65	68.76	11.06	5.00	11.63	2.86	10.82	3.42
WIC with two years PLDK									
Boys	17	93.76	42.08	9.18	4.59	10.78	2.17	10.12	3.22
Girls	17	142.53	193.87	13.18	15.79	10.19	2.35	10.24	3.96
Total	34	118.15	140.34	11.18	11.63	10.49	2.25	10.18	3.55
SCRP without PLDK									
Boys	14	115.93	73.98	10.50	6.43	10.61	2.30	9.57	2.93
Girls	14	97.43	19.07	9.29	2.16	10.69	1.72	9.93	3.29
Total	28	106.68	53.85	9.89	4.75	10.65	2.00	9.75	3.06
SCRP with one year PLDK									
Boys	14	84.29	35.96	9.07	3.10	9.24	2.12	10.29	2.89
Girls	14	105.64	53.47	10.14	4.69	10.41	2.44	10.50	2.38
Total	28	94.96	46.02	9.61	3.94	9.82	2.32	10.39	2.60
SCRP with two years PLDK									
Boys	14	104.29	53.13	10.64	4.88	9.66	2.26	10.57	2.65
Girls	14	102.07	28.96	10.21	2.52	9.94	1.23	10.21	2.49
Total	28	103.18	42.00	10.43	3.81	9.80	1.79	10.39	2.53
Experimental Reading Totals									
ITA	120	93.63	47.31	9.46	4.51	10.03	2.43	10.06	3.26
WIC	102	111.08	100.25	10.40	8.24	10.47	2.53	9.84	3.28
SCRP	84	101.61	47.23	9.98	4.15	10.09	2.06	10.18	2.72
Experimental PLDK Totals									
Without PLDK	102	95.59	58.87	9.65	5.56	9.86	2.09	9.45	2.98
With one year PLDK	102	106.50	55.85	10.04	4.48	10.59	2.66	10.69	3.31
With two years PLDK	102	102.82	89.66	10.06	7.45	10.14	2.31	9.92	2.97
Grand Experimental Total									
Boys	153	96.18	52.51	9.70	4.43	9.80	2.14	10.03	3.24
Girls	153	107.10	83.31	10.12	7.15	10.59	2.53	10.01	3.01
Total	306	101.64	69.74	9.92	5.94	10.19	2.37	10.02	3.12

Table 25

Analysis of Variance of Total Words on the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	6287.5000	3143.7500	0.6548	2.30
B (Reading Methods)	2	16779.3000	8389.6500	1.7474	2.30
C (Sex)	1	9124.9000	9124.9000	1.9006	2.71
A x B	4	29568.9000	7392.2250	1.5397	1.94
A x C	2	3020.9000	1510.4500	0.3146	2.30
B x C	2	3318.8000	1659.4000	0.3456	2.30
A x B x C	4	32387.4000	8096.8500	1.6864	1.94
Error	288	1382737.1000	4801.1700		
Total	305	1483224.8000			

the various treatment combinations.

In light of these analyses, the following can be concluded from the Oral Picture Story Language Test data:

a) There was only slight evidence in support of the PLDK program. On one measure, the W/1 group was superior to the W/O group, while on another measure the W/1 group was superior to both the W/O and W/2 groups.

b) As anticipated, overall, different experimental reading programs did not have a differential effect on measures of oral language development.

Table 26

Analysis of Variance of Total Sentences on the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	11.0040	5.5020	0.1554	2.30
B (Reading Methods)	2	49.5260	24.7630	0.6995	2.30
C (Sex)	1	13.3850	13.3850	0.3781	2.71
A x B	4	132.2760	33.0690	0.9341	1.94
A x C	2	72.2620	36.1310	1.0206	2.30
B x C	2	15.3240	7.6620	0.2164	2.30
A x B x C	4	273.9720	68.4930	1.9347	1.94
Error	288	10196.0440	35.4030		
Total	305	10763.7910			

c) On one out of four measures only, girls were significantly superior to boys in the ability to relate a story orally.

II. The Second Analysis (PLDK Treatments Differences by Sex)

This section examines the effectiveness of the PLDK treatments. On page 19, under Analysis of Data (and in Figure 2) the analysis of variance design used in this portion of the report was described. It is different from the first analysis in two important ways. First, it includes data on the control group. Second, the data across the three experimental reading treatments were combined.

Table 27

Analysis of Variance of Words Per Sentence Scores on the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	2759.4000	1379.7000	2.6533*	2.30
B (Reading Methods)	2	1210.7000	605.3500	1.1641	2.30
C (Sex)	1	4682.3000	4682.3000	9.0044**	2.71
A x B	4	8201.4000	2050.3500	3.9430**	1.94
A x C	2	1421.7000	710.8500	1.3670	2.30
B x C	2	2429.8000	1214.9000	2.3363*	2.30
A x B x C	4	1210.2000	302.5500	0.5818	1.94
Error	288	149760.6000	520.0020		
Total	305	171676.1000			

*p <.10
**p <.01

The PLDK analyses were performed on all 354 subjects described in Table 1. These data are collapsed and reproduced again in Table 29. Examination of Table 29 reveals that the groups were highly similar on pretest CA, IQ, and LA. In Table 2, the analysis of variance revealed that no significant differences existed among treatment groups on these three pretest measures.

1) General Intellectual Functioning. The pre-, post-, followup-test data and gain scores on the Stanford-Binet Intelligence Scale are reported in Table 30. In terms of overall totals, the average IQ of the

Table 28

Analysis of Variance of Abstract-Concrete Scores on the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	2	79.2940	39.6470	4.0593*	2.30
B (Reading Methods)	2	5.4780	2.7390	0.2804	2.30
C (Sex)	1	0.0520	0.0520	0.0053	2.71
A x B	4	62.8230	15.7060	1.6081	1.94
A x C	2	2.6910	1.3460	0.1378	2.30
B x C	2	2.3840	1.1920	0.1220	2.30
A x B x C	4	8.3000	2.0750	0.2125	1.94
Error	288	2812.8610	9.7670		
Total	305	2973.8830			

*p <.05

354 subjects, upon entering school, was 86.87. The average IQ score had risen only 2.74 points to 89.61 by the end of the second grade. By the end of the third grade this had dropped back 0.96 points to 88.65. In terms of these descriptive statistics, the gains and losses from pre-, to post-, to followup-testing appear to be minimal.

The analysis of variance data in Table 31 reveal no significant PLDK effect, regardless of sex. Thus, the other data in this table are secondary and largely irrelevant to the basic hypothesis regarding the effectiveness of the PLDK activities, though the interaction involving

Table 29

Means and Standard Deviations on Pretest Data for the Selected Samples Used in the PLDK Analyses

Treatment Group	N	CA		IQ		LA	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Without PLDK							
Boys	51	74.22	3.76	86.84	9.95	62.12	7.53
Girls	51	74.18	3.82	87.63	10.88	62.94	8.25
Total	102	74.20	3.77	87.24	10.38	62.53	7.87
One Year PLDK							
Boys	51	74.14	4.22	86.82	11.29	62.88	8.44
Girls	51	73.53	4.03	86.41	11.81	62.43	9.16
Total	102	73.83	4.12	86.62	11.50	62.66	8.77
Two Years PLDK							
Boys	51	74.37	4.67	89.02	9.58	62.02	8.42
Girls	51	73.55	3.88	85.86	9.65	63.76	8.51
Total	102	73.96	4.29	87.44	9.70	62.89	8.47
Control							
Boys	24	73.75	3.69	83.00	10.19	60.50	5.60
Girls	24	73.04	3.56	87.79	10.27	60.12	6.43
Total	48	73.40	3.60	85.40	10.40	60.31	5.97
Grand Total							
Boys	177	74.18	4.13	86.94	10.36	62.09	7.82
Girls	177	73.66	3.85	86.79	10.69	62.65	8.39
Total	354	73.92	4.00	86.87	10.51	62.37	8.10

PLDK are relevant.

There was a significant main effect for "Test Years." The t-test breakdown revealed a significant overall difference between pre- and post-testing two years later. However, there was no significant growth in IQ scores occurring from post to followup testing.

There was a significant triple interaction among Test Years by PLDK Treatments by Sex, and a double interaction between Test Years and PLDK

Table 30

Means and Standard Deviations on IQ Scores of the Stanford-Binet Intelligence Scale: Pretest-, Posttest-, Follow-up-, and Gain Scores

Treatment Group	N		Pre	Post	Follow-up	Gain[a]	Gain[b]	Gain[c]
Without PLDK								
Boys	51	$\bar{X}$	86.84	91.53	89.47	4.69	2.63	-2.06
		s	9.95	13.03	11.73			
Girls	51	$\bar{X}$	87.63	88.80	88.12	1.17	0.49	-0.68
		s	10.88	13.98	13.16			
Total	102	$\bar{X}$	87.24	90.17	88.79	2.93	1.55	-1.38
		s	10.38	13.52	12.42			
One Year PLDK								
Boys	51	$\bar{X}$	86.82	89.35	89.41	2.53	2.59	0.06
		s	11.29	13.48	13.82			
Girls	51	$\bar{X}$	86.41	89.10	89.27	2.69	2.86	0.17
		s	11.81	13.96	15.07			
Total	102	$\bar{X}$	86.62	89.23	89.34	2.61	2.72	0.11
		s	11.50	13.66	14.39			
Two Years PLDK								
Boys	51	$\bar{X}$	89.02	91.73	89.00	2.71	-0.02	-2.73
		s	9.58	13.42	11.71			
Girls	51	$\bar{X}$	85.86	90.35	87.18	4.49	1.32	-3.17
		s	9.65	12.95	11.10			
Total	102	$\bar{X}$	87.44	91.04	88.09	3.60	0.65	-2.95
		s	9.70	13.14	11.39			
Control								
Boys	24	$\bar{X}$	83.00	87.62	86.92	4.62	3.92	-0.70
		s	10.19	14.54	13.82			
Girls	24	$\bar{X}$	87.79	94.75	89.17	-3.04	1.38	4.42
		s	10.27	10.42	14.24			
Total	48	$\bar{X}$	85.40	86.19	88.04	0.79	2.64	1.85
		s	10.40	12.59	13.93			
Grand Total								
Boys	177	$\bar{X}$	86.94	90.43	88.97	3.49	2.03	-1.46
		s	10.36	13.45	12.57			
Girls	177	$\bar{X}$	86.79	88.79	88.32	2.00	1.53	-0.47
		s	10.69	13.25	13.27			
Total	354	$\bar{X}$	86.87	89.61	88.65	2.74	1.78	-0.96
		s	10.51	13.36	12.91			

[a]Posttest minus pretest IQ.
[b]Follow-up test minus pretest IQ.
[c]Follow-up test minus posttest IQ.

Table 31

Analysis of Variance of IQ Scores on the

Stanford-Binet Intelligence Scale

Pretest, Posttest, and Follow-up Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
Between Subjects	353	129932.5920	368.0810		
B (PLDK)	3	593.9890	197.9960	0.5318	2.08
C (Sex)	1	176.5430	176.5430	0.4742	2.71
B x C	3	333.6890	111.2300	0.2987	2.08
Error (b)	346	128828.3710	372.3360		
Within Subjects	708	32226.0000	45.5170		
A (Test Years)	2	1368.5500	684.2750	15.8872**	2.30
A x B	6	482.0600	80.3430	1.8654*	1.77
A x C	2	102.0870	51.0430	1.1851	2.30
A x B x C	6	468.3460	78.0580	1.8123*	1.77
Error (w)	692	29604.9580	43.0710		
Total	1061	162158.5920			

*p <.10
**p <.01

treatment. The t-test analyses between pairs of data indicated a significant decrement in IQ scores from posttest to followup test for both the boys and the girls within the PLDK W/2 group. Another interesting finding is that the controls had no significant increase in IQ scores from pre- to post-testing (0.79), but gained significantly from post- to followup-testing (1.85). A number of other t-test values were statistically significant but did not contribute to an understanding of the effectiveness of the PLDK exercises.

The following conclusions are drawn regarding IQ scores:

a) The PLDK exercises were not demonstrated, at time of post-testing, to increase IQ scores significantly. It is not surprising that this finding continued into the followup analysis.

b) Overall, the children in this experiment increased significantly in IQ scores (2.74 points) from pre- to post-testing, but declined in IQ slightly during their third year in school (-0.96).

2) Psycholinguistic Development. The pre-, post-, and followup-test data and gain language age (LA) scores on the Illinois Test of Psycholinguistic Abilities appears in Table 32. In terms of overall totals, the 354 children gained 18.08 months in language during their first two years in school, or an average of 9.04 months yearly. During their third year in school they increased 8.55 months for a total of 26.61 months from pre- to followup-testing. In terms of differences across PLDK groups, the gains from pre- to followup-testing were fairly even, with the largest (27.93) being for the W/1 group, and the smallest (24.63) for the control group.

Table 32

Means and Standard Deviations for LA Scores on the Illinois Test of Psycholinguistic Abilities Pre-, Post-, Follow-up, and Gain Scores

Treatment Group	N		Pre-	Post-	Follow-up-	Gain[a]	Gain[b]	Gain[c]
Without PLDK (W/O)								
Boys	51	$\bar{X}$	62.12	80.57	38.49	18.45	26.37	7.92
		S	7.53	11.19	11.15			
Girls	51	$\bar{X}$	62.94	80.12	88.80	17.18	25.86	8.68
		S	8.25	12.32	12.00			
Total	102	$\bar{X}$	62.53	80.34	88.65	17.81	26.12	8.31
		S	7.87	11.71	11.53			
One Year PLDK (W/1)								
Boys	51	$\bar{X}$	62.88	82.10	91.31	19.22	28.43	9.21
		S	8.44	11.43	12.64			
Girls	51	$\bar{X}$	62.43	80.35	89.86	17.92	27.43	9.51
		S	9.16	11.85	13.99			
Total	102	$\bar{X}$	62.66	81.23	90.59	18.57	27.93	9.36
		S	8.77	11.62	13.29			
Two Years PLDK (W/2)								
Boys	51	$\bar{X}$	62.02	83.18	91.12	21.16	29.10	7.94
		S	8.42	10.12	12.36			
Girls	51	$\bar{X}$	63.76	80.35	88.25	16.59	24.49	7.90
		S	8.51	10.58	10.99			
Total	102	$\bar{X}$	62.89	81.76	89.69	18.87	26.80	7.93
		S	8.47	10.40	11.72			
Control (C)								
Boys	24	$\bar{X}$	60.50	77.54	85.08	17.04	24.58	7.54
		S	5.60	10.92	12.79			
Girls	24	$\bar{X}$	60.12	75.00	84.79	14.88	24.67	9.79
		S	6.43	8.68	8.71			
Total	48	$\bar{X}$	60.31	76.27	84.94	15.96	24.63	8.67
		S	5.97	9.84	10.82			
Grand Total								
Boys	177	$\bar{X}$	62.09	81.35	89.60	19.26	27.51	8.25
		S	7.82	10.98	12.25			
Girls	177	$\bar{X}$	62.65	79.56	88.41	16.91	25.76	8.85
		S	8.39	11.31	11.97			
Total	354	$\bar{X}$	62.37	80.45	89.00	18.08	26.63	8.55
		S	8.10	11.17	12.11			

[a]Posttest minus pretest IQ.
[b]Followup test minus pretest IQ.
[c]Followup test minus posttest IQ.

The analysis of variance data on these statistics are reported in Table 33. They were significant main effects on the PLDK variable and on test years, as well as a significant interaction between test years and PLDK treatment. The t-test breakdown revealed that the W/O, W/1, and W/2 group gained in LA over the controls during the three year period--with no significant differences among the W/O, W/1, and W/2 groups. All three experimental reading groups gained significantly more than the controls. Both boys and girls gained significantly in LA from pre- to post-testing, and from post- to followup-testing, with a larger gain from pre- to post-testing than from post- to followup-testing which was anticipated since a two-years growth period was being compared with one year of growth. The boys made greater gains than girls from pretest to posttest evaluations.

The following conclusion is drawn with respect to the effectiveness of the PLDK exercises in stimulating overall language age scores on the ITPA:

a) There was no significant difference in the gains made by the W/O, W/1, and W/2 groups over the three year period. However, all three experimental reading groups obtained higher scores than the controls. One finds no support for the PLDK treatment in the ITPA-LA results.

3) Creative Thinking. Followup scores on total Verbal Subtests of the Torrance Tests of Creative Thinking are reported in Table 34. Examination of the mean values in Table 34 reveals a gradual increment in values from 70.58 for the controls, to 73.62 for the children in experimental reading programs without PLDK (W/O), to 84.27 for those with one year of PLDK (W/1), to 86.72 for those with two years of PLDK (W/2).

Analysis of variance data on the Torrance Tests appear in Table 35. A significant main effect was obtained on levels of PLDK only. There was not a significant main effect difference on boys vs. girls, or a significant interaction between the PLDK and sex dimensions. The t-test breakdown on PLDK treatments revealed, as expected, no significant difference between the controls and the W/0 group. Both the one year and two year PLDK groups were superior to the non-PLDK and control groups. However, there was no significant difference between the W/1 and W/2 groups, indicating that one year was as effective as two years of PLDK exercises in stimulating verbal performance on the Torrance Tests of Creative Thinking. (These findings are more heartening than those found in the CLDP where the positive effects of the PLDK in stimulating creativity were lost in the followup year.)

The following conclusions are drawn from the analyses of Verbal Subtest scores on the Torrance Test of Creative Thinking:

a) One or two years of PLDK exercises are more effective than no PLDK training in stimulating verbal performance on the Torrance Tests of Creative Thinking.

b) One year of PLDK exercises is equally as effective as two years of such exercises in stimulating creativity scores.

4) School Achievement. Grade equivalent scores on the Metropolitan Achievement Tests are presented in Table 36 and raw scores in Table 37. The scores were derived from the five written language subtests: a) Word Knowledge, b) Word Discrimination, c) Reading Comprehension, d) Spelling,

Table 33

Analysis of Variance for LA Scores on the Illinois Test of Psycholinguistic Abilities Pretest, Posttest, and Follow-up Test Scores

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
Between Subjects	353	91747.4960	259.9080		
B (PLNK)	3	2155.5490	718.5160	2.7839*	2.08
C (Sex)	1	173.2970	173.2970	0.6714	2.71
B x C	3	116.9690	38.9900	0.1511	2.08
Error (b)	346	89301.6820	258.0970		
Within Subjects	708	158128.6670	223.3460		
A (Test Years)	2	130912.8660	65456.4330	1709.2403**	2.30
A x B	6	273.8100	45.6350	1.1917	1.77
A x C	2	264.0230	132.0110	3.4472*	2.30
A x B x C	6	177.3920	29.5650	0.7720	1.77
Error (w)	692	26500.5750	38.2960		
Total	1061	249876.1630			

*p <.05
**p <.01

Table 34

Means and Standard Deviations on Total Verbal Subtest Scores of Torrance Tests of Creative Thinking

Treatment Group	N	$\bar{X}$	S
Without PLDK			
Boys	51	77.59	23.60
Girls	51	69.65	28.27
Total	102	73.62	26.21
One Year PLDK			
Boys	51	83.53	22.20
Girls	51	85.02	28.27
Total	102	84.27	25.30
Two Years PLDK			
Boys	51	82.78	33.91
Girls	51	90.65	32.23
Total	102	86.72	33.15
Control			
Boys	24	66.46	20.32
Girls	24	74.71	18.26
Total	48	70.58	19.56
Grand Total			
Boys	177	79.29	26.66
Girls	177	80.81	29.45
Total	354	80.05	28.06

Table 35

Analysis of Variance on Total Verbal Subtest Scores of the Torrance Tests of Creativity

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	14874.2610	4958.0870	6.6237*	2.08
B (Boys vs. Girls)	1	205.9322	205.9322	0.2751	2.71
A x B	3	3852.0138	1284.0046	1.7153	2.08
Error	346	258992.8778	748.5343		
Total	353	277925.0848			

*p <.01

and e) Language. The total written language score was obtained by averaging these five subtests. Examination of Table 36 reveals that the 354 subjects were achieving at the 2.61 grade level in March to April of their second year in school, and had increased their scores only to 2.74 during their third year in school. (See page 37 for a discussion of these findings.)

The analysis of variance on the posttest data collected in 1967 are reported in an earlier monograph (Dunn, Neville, Pfost, Pochanart, & Bruininks, 1968). The few subjects who were lost from posttesting to followup testing (from 408 to 354) were scattered quite evenly across the various treatment groups. The posttest results of the present sample of 354 subjects directly parallel those obtained in the earlier analyses on the 408 subjects. The analyses contained in the earlier monograph

Table 36

Grade Equivalent Means and Standard Deviations on the Written Language Subtests and Total Written Language Scores of the Metropolitan Achievement Tests

Treatment Group	N		Total			WK			WD			R			S			L
			Post	Follow-up	Diff.	Post	Follow-up	Diff.	Post	Follow-up	Diff.	Post	Follow-up	Diff.	Post	Follow-up	Diff.	Follow-up
Without FLDK (W/O)																		
Boys	51	$\bar{X}$	2.47	2.59	0.12	2.33	2.77	0.44	2.77	2.67	-0.10	2.43	2.51	0.08	2.34	2.94	0.60	2.07
		S	0.86	0.75		0.76	0.85		1.03	0.87		0.76	0.65		1.07	1.16		0.78
Girls	51	$\bar{X}$	3.08	3.21	0.13	2.86	3.07	0.21	3.32	3.29	-0.03	2.96	3.17	0.21	3.17	3.88	0.71	2.66
		S	1.00	0.84		0.92	0.85		1.12	0.77		0.97	0.64		1.23	1.32		1.20
Total	102	$\bar{X}$	2.77	2.90	0.13	2.59	2.92	0.33	3.04	2.98	-0.06	2.70	2.84	0.14	2.76	3.41	0.65	2.36
			0.97	0.85		0.88	0.86		1.11	0.88		0.91	0.72		1.22	1.32		1.05
One Year FLDK (W/1)																		
Boys	51	$\bar{X}$	2.35	2.60	0.25	2.31	2.76	0.45	2.55	2.79	0.24	2.30	2.61	0.31	2.24	2.98	0.74	1.87
		S	0.86	0.95		0.82	1.04		0.95	1.00		0.74	0.83		1.17	1.37		0.98
Girls	51	$\bar{X}$	2.66	2.80	0.14	2.42	2.80	0.38	2.81	2.95	0.14	2.59	2.71	0.12	2.80	3.30	0.50	2.22
		S	0.90	0.86		0.79	0.86		1.05	0.86		0.75	0.74		1.33	1.39		1.06
Total	102	$\bar{X}$	2.50	2.70	0.20	2.36	2.78	0.42	2.68	2.87	0.19	2.44	2.66	0.22	2.52	3.14	0.62	2.05
		S	0.90	0.91		0.81	0.95		1.01	0.93		0.75	0.78		1.28	1.38		1.03
Two Years FLDK (W/2)																		
Boys	51	$\bar{X}$	2.66	2.65	-0.01	2.53	2.86	0.33	3.02	2.80	-0.22	2.41	2.55	0.14	2.66	3.13	0.47	1.92
		S	0.83	0.83		0.89	0.93		1.02	0.90		0.66	0.83		1.11	1.24		0.87
Girls	51	$\bar{X}$	2.80	2.77	-0.03	2.66	2.79	0.13	3.14	2.90	-0.24	2.48	2.71	0.23	2.94	3.33	0.39	2.10
			0.74	0.60		0.81	0.66		0.97	0.66		0.57	0.55		1.08	1.04		0.90
Total	102	$\bar{X}$	2.73	2.71	-0.02	2.59	2.83	0.24	3.08	2.85	-0.23	2.44	2.63	0.19	2.80	3.23	0.43	2.01
		S	0.79	0.72		0.85	0.81		0.99	0.79		0.62	0.71		1.10	1.14		0.89
Control (C)																		
Boys	24	$\bar{X}$	2.07	2.30	0.23	2.03	2.44	0.41	2.21	2.42	0.21	2.29	2.42	0.13	1.77	2.38	0.61	1.85
		S	0.65	0.85		0.55	0.92		0.72	0.89		0.69	0.86		0.83	0.98		1.09
Girls	24	$\bar{X}$	2.39	2.80	0.41	2.22	2.83	0.61	2.44	3.00	0.56	2.45	2.81	0.36	2.43	3.22	0.79	2.17
		S	0.58	0.68		0.49	0.63		0.68	0.62		0.53	0.63		0.95	1.20		0.97
Total	48	$\bar{X}$	2.23	2.55	0.32	2.12	2.63	0.51	2.32	2.71	0.39	2.37	2.62	0.25	2.10	2.80	0.70	2.01
		S	0.63	0.80		0.52	0.81		0.70	0.82		0.61	0.77		0.94	1.16		1.03
Grand Total																		
Boys	177	$\bar{X}$	2.43	2.57	0.14	2.34	2.75	0.41	2.70	2.71	0.01	2.37	2.54	0.17	2.33	2.93	0.60	1.94
		S	0.84	0.85		0.80	0.94		1.00	0.92		0.71	0.78		1.11	1.24		0.91
Girls	177	$\bar{X}$	2.78	2.91	0.13	2.59	2.88	0.29	3.00	3.04	0.04	2.65	2.86	0.21	2.90	3.47	0.57	2.31
		S	0.88	0.78		0.83	0.78		1.04	0.76		0.77	0.67		1.20	1.27		1.07
Total	354	$\bar{X}$	2.61	2.74	0.13	2.46	2.81	0.35	2.85	2.87	0.02	2.51	2.70	0.19	2.61	3.20	0.59	2.32
		S	0.88	0.83		0.82	0.87		1.03	0.86		0.76	0.75		1.19	1.28		1.01

Table 37

Raw Score Means and Standard Deviations on Written Language Subtests and Total Written Language Scores on the Metropolitan Achievement Tests

Treatment Group	N	Total		WK		WD		R		S		L	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Without PLDK													
Boys	51	13.12	6.89	14.51	9.00	11.18	7.51	11.25	5.43	10.92	10.13	17.75	7.15
Girls	51	18.64	7.52	17.80	8.88	16.73	7.07	16.90	5.66	19.20	11.51	22.57	9.78
Total	102	15.88	7.69	16.16	9.05	13.95	7.82	14.08	6.20	15.06	11.56	20.16	8.86
One Year PLDK													
Boys	51	13.09	8.61	14.67	10.61	12.00	8.46	12.12	7.19	11.25	12.36	15.43	9.11
Girls	51	14.97	7.87	15.04	8.81	13.45	7.77	13.10	6.27	14.29	12.42	18.98	9.36
Total	102	14.03	8.27	14.85	9.70	12.73	8.12	12.61	6.73	12.77	12.42	17.21	9.36
Two Years PLDK													
Boys	51	13.83	7.55	15.94	9.58	12.41	7.68	11.73	6.87	12.61	11.05	16.47	8.40
Girls	51	14.74	5.58	14.86	7.02	13.04	5.96	12.88	4.91	14.37	9.78	18.55	7.43
Total	102	14.29	6.62	15.40	8.37	12.73	6.85	12.30	5.97	13.49	10.42	17.51	7.96
Control													
Boys	24	10.65	7.55	11.17	9.30	8.88	7.82	10.71	7.24	5.83	8.28	16.67	8.81
Girls	24	14.78	6.51	15.08	7.02	13.79	6.04	13.75	5.61	12.96	10.64	18.33	9.04
Total	48	12.72	7.28	13.12	8.39	11.33	7.35	12.23	6.59	9.40	10.09	17.50	8.87
Grand Total													
Boys	177	12.98	7.69	14.51	9.72	11.46	7.93	11.56	6.60	10.81	10.98	16.56	8.31
Girls	177	15.94	7.15	15.79	8.16	14.32	6.97	14.22	5.85	15.55	11.36	19.80	9.03
Total	354	14.46	7.56	15.15	8.98	12.89	7.59	12.89	6.37	13.18	11.40	18.18	8.82

(Dunn et al., 1968) revealed that both the PLDK and non-PLDK experimental reading groups were significantly superior to the control group on overall written language achievement. Both W/O and W/2 PLDK experimental reading groups obtained significantly higher scores than the W/1 and control groups, but did not differ significantly from one another. Furthermore, the one-year PLDK group was significantly superior to the controls. Finally, girls obtained significantly higher grade equivalent scores than the boys (girls = 2.76 in last year's report vs. 2.78 in Table 35; boys = 2.40 in last year's report vs. 2.43 in Table 35).

In Table 38 is the analysis of variance on the followup total written language raw scores. The results are exactly parallel to last year (see Table 16 in last year's report). There were main effects on both the PLDK and boys vs. girls dimensions, with no interaction between the two. On this year's followup data, the t-test breakdown on the PLDK dimension revealed only a significant difference between the controls (2.23) and the W/O group (2.77) (experimental reading program without PLDK). Again girls achieved significantly above boys (girls = 2.80; boys = 2.30). It appears that the PLDK exercises had no significant effect on overall written language achievement as measured after the children had completed three years in school.

In Tables 40 through 44 are the analysis of variance statistics for each of the five written language subtests of the MAT. In light of the inconsequential gains made by the subjects in each of the groups during their third year in school (see Table 37), it makes little sense to discuss--ad nauseam--the minutia concerning these subtests. However, the tables are included in the report for those few who may wish to study

Table 38

Analysis of Variance on Total Written Language Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	9332.8871	3110.9623	2.3017*	2.08
B (Boys vs. Girls)	1	19302.2485	19302.2485	14.2813**	2.71
A x B	3	8008.5161	2669.5053	1.9751	2.08
Error	346	467644.6082	1351.5740		
Total	353	504308.2599			

*p <.10
**p <.01

them. The findings are summarized from them in Table 39 and indicate the following:

In terms of main effects on the PLDK dimension, significance was obtained on three of the five subtests, namely Word Discrimination, Spelling, and Language. However, we want to point out that there is no evidence here to support the PLDK lessons since most of the differences occurred between the controls and the PLDK W/O group. Generally, the pupils in the experimental reading program were achieving more than the pupils under control teacher.

In terms of the main effects on boys vs. girls, significance was attained on four of the five subtests with girls always superior to boys. Again, this is not evidence in favor of the PLDK, but rather supports the repeatedly discovered finding that girls do better than boys in school achievement during their years in the elementary grades.

Table 39

Summary Table of Inferential Statistics including t-test Values, for the Follow-up Raw Scores on the Five Written Language Subtests of the Metropolitan Achievement Tests

Variables	Total Written Language	Five Written Language Subtests				
		WK	WD	R	S	L
Sig. PLDK Main Effect	Yes	No	Yes	No	Yes	Yes
C x W/0	2.4597*	N/A*	3.4395*	N/A	2.9325*	1.7583*
C x W/1	1.0236	N/A	0.2769	N/A	1.7496*	-0.1947
C x W/2	1.2203	N/A	0.5232	N/A	2.1201*	0.0064
W/0 x W/1	1.7943	N/A	3.9515*	N/A	1.4780	2.4402*
W/0 x W/2	1.5486	N/A	3.6438*	N/A	1.0150	2.1888*
W/1 x W/2	-0.2457	N/A	-0.3077	N/A	-0.4630	-0.2513
Sig. Boys vs. Girls Main Effect	Yes	No	Yes	Yes	Yes	Yes
Sig. PLDK x Sex Interaction	No	No	No	Yes	No	No

* = Statistically significant values; N/A = not applicable

Note: C = control; W/1 = experimental reading treatment without PLDK lessons; W/1 = experimental reading treatment plus one year of PLDK lessons; W/2 = experimental reading treatment plus two years of PLDK lessons; WK = Word Knowledge; WD = Word Discrimination; R = Reading Comprehension; S = Spelling; L = Language.

There was one significant interaction between PLDK vs. sex, namely on reading comprehension. Again, the t-values were largely statistically significant between the controls and the W/O group which provides no evidence in the effectiveness of the PLDK lessons. The most dramatic observation was that the W/O girls were achieving in reading comprehension (3.17) significantly above the controls (2.81), W/1 (2.71) and W/2 (2.71) PLDK groups. This was probably due to the teacher variable, with one remarkably able teacher in the W/O experimental reading treatments having a better pupil achievement history than any other teacher in the project (see Teacher #21 in Table 17.)

The following conclusions are drawn from the MAT data concerning the effectiveness of the PLDK exercises:

a) At the conclusion of the two year experimental period, both the PLDK and non-PLDK experimental reading groups were superior to the controls in overall written language achievement, with the W/O and W/2 experimental groups both superior to the W/1 PLDK group and the controls. In the followup analyses the W/O PLDK group was superior to the controls, and equal to the W/1 and W/2 groups.

b) Girls achieved generally at a significantly higher level than boys on the written language subtests of the Metropolitan Achievement Tests.

Table 40

Analysis of Variance on Word Knowledge Subtest Raw Scores on the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	315.7087	105.2362	1.3155	2.08
B (Boys vs. Girls)	1	144.2825	144.2825	1.8036	2.71
A x B	3	349.7025	116.5675	1.4571	2.08
Error	346	27678.0691	79.9944		
Total	353	28487.7628			

Table 41

Analysis of Variance on Follow-up Word Discrimination Subtest Raw Scores of the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	1159.3209	386.4403	7.2835*	2.08
B (Boys vs. Girls)	1	726.1270	726.1270	13.6859*	2.71
A x B	3	95.7699	31.9233	0.6016	2.08
Error	346	18357.4856	53.0563		
Total	353	20338.7034			

*p <.01

Table 42

Analysis of Variance on Follow-up Reading Comprehension Subtest Raw Scores on the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	208.1769	69.3923	1.8287	2.08
B (Boys vs. Girls	1	624.0113	624.0113	16.4452**	2.71
A x B	3	358.8230	119.6076	3.1521*	2.08
Error	346	13128.9098	37.9448		
Total	353	14319.9210			

*p <.05
**p <.01

Table 43

Analysis of Variance on Follow-up Spelling Subtest Raw Scores on the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	1073.9991	357.9997	2.9374*	2.08
B (Boys vs. Girls)	1	1983.7400	1983.7400	16.2769**	2.71
A x B	3	686.3198	228.7732	1.8771	2.08
Error	346	42168.3705	121.8739		
Total	353	45912.4294			

*p <.05
**p <.01

Table 44

Analysis of Variance on Follow-up Language Subtest

Raw Scores on the Metropolitan Achievement Tests

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	563.4081	187.8027	2.5166*	2.08
B (Boys vs. Girls)	1	927.4830	927.4830	12.4288**	2.71
A x B	3	130.4872	43.4957	0.5828	2.08
Error	346	25819.6867	74.6233		
Total	353	27441.0650			

*p <.10
**p <.01

5) Written Language Development. The written language development descriptive data obtained from Myklebust's Written Picture Story Language Test are found in Table 45. It will be recalled the task for each subject was to write a creative story stimulated by the standard picture provided in the test kit. Examination of the means in Table 45 indicates, in almost all cases, that the W/O PLDK group was superior to all three other groups (Controls, W/1 PLDK, and W/2 PLDK). Furthermore, with two exceptions, the control group always attained the lowest creativity score. Tables 47 through 51 provide the analyses of variance data for each of the five measures. However, Table 46 contains an overall summary of the results from these analyses.

Table 45

Mean and Standard Deviation Follow-up Raw Scores on Myklebust's Written Picture Story Language Test

Treatment Group	N	Total Words		Total Sentences		Words/Sentence		Syntax Q		Abstract-Concrete	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Without PLDK (W/O)											
Boys	51	61.78	44.45	7.69	4.38	7.65	3.31	80.24	24.75	8.75	5.41
Girls	51	78.41	39.78	9.57	4.73	8.17	2.69	89.15	7.87	10.29	4.24
Total	102	70.10	42.80	8.63	4.63	7.91	3.01	84.70	18.61	9.52	4.90
One Year PLDK (W/1)											
Boys	51	52.73	33.52	7.29	4.58	6.42	2.82	72.05	34.39	7.47	5.35
Girls	51	60.31	34.13	8.06	4.26	7.19	2.87	77.80	27.40	8.71	5.10
Total	102	56.52	33.88	7.68	4.42	6.81	2.86	74.93	31.07	8.09	5.24
Two Years PLDK (W/2)											
Boys	51	69.53	62.52	9.02	7.26	7.33	2.72	80.01	25.09	8.84	5.92
Girls	51	67.18	42.74	8.88	5.29	6.99	2.53	84.17	19.41	9.12	5.08
Total	102	68.35	53.30	8.95	6.32	7.16	2.62	82.09	22.41	8.98	5.49
Control (C)											
Boys	24	37.21	25.70	5.33	3.96	6.43	3.21	69.75	32.71	6.04	4.49
Girls	24	67.38	32.55	9.50	4.48	7.23	1.55	84.74	19.02	8.38	4.69
Total	48	52.29	32.77	7.42	4.69	6.83	2.53	77.25	27.53	7.21	4.69
Grand Total											
Boys	177	58.07	46.77	7.64	5.46	7.04	3.02	76.39	29.12	8.04	5.48
Girls	177	68.46	38.56	8.93	4.74	7.42	2.60	83.85	20.10	9.24	4.82
Total	354	63.27	43.11	8.28	5.14	7.23	2.82	80.12	25.27	8.64	5.19

Table 46

Summary Table of Inferential Statistics including t-test Values for the Follow-up Raw Scores on Myklebust's Written Picture Story Language Test

Variables	Raw Test Scores on Myklebust's Written Story Language Test				
	Productivity Measures				
	Total Words	Total Sentences	Words per Sentence	Grammatical Correctness	Level of Abstraction
Sig. PLDK Main Effect	Yes	No	Yes	Yes	Yes
C x W/0	2.4071*	N/A	2.2115*	1.7144*	2.5761*
C x W/1	0.5715	N/A	-0.0518	-0.5333	0.9807
C x W/2	2.1712*	N/A	0.6718	1.1149	1.9750*
W/0 x W/1	2.2936*	N/A	2.8280*	2.8085*	1.9933*
W/0 x W/2	0.2947	N/A	1.9238	0.7490	0.7510
W/1 x W/2	-1.9988*	N/A	-0.9042	-2.0595*	-1.2423
Sig. Boys vs. Girls Main Effect	Yes	Yes	No	Yes	Yes
Sig. PLDK x Sex Interaction	No	Yes	No	No	No

Note: * = statistically significant values; N/A = not applicable; C = Control; W/0 = experimental reading treatment without PLDK lessons; W/1 = experimental reading treatment plus one year of PLDK lessons; W/2 = experimental reading treatment plus two years of PLDK lessons.

As summary Table 46 indicates, there was a significant main effect for PLDK groups on four of the five subtests. Again the effect was due to the W/O PLDK group being superior, generally, to both the controls and the W/1 PLDK groups.

Significant differences between the boys and girls occurred on four of the five subtests, with the girls obtaining consistently superior scores.

The following conclusions are drawn concerning the PLDK treatment from the followup data on the Written Language Story Test analyses:

a) Little evidence was found to support the effectiveness of the PLDK lessons. As on other measures, the W/O PLDK group was equal to the W/2 PLDK group, but generally superior to the group with one year of PLDK lessons.

b) Girls were again superior to boys on most of the measures of written language performance.

6) Oral Language Development. The Oral Picture Story Language Test was a project-designed measure made to parallel Myklebust's Written Picture Story Language Test. As mentioned earlier, the subjects were again presented with a picture but this time asked to tell their stories orally to the examiner, who in turn tape recorded them. Measures were obtained of productivity and level of abstraction. (There was no written story upon which to obtain a measure of grammatical correctness which included punctuation, etc.)

The means on productivity (total words, total sentences, and words per sentence), and degree of abstraction (abstract-concrete) scores on the Oral Picture Story Language Test appear in Table 52. In contrast with

Table 47

Analysis of Variance on Total Words of Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	17823.8143	5941.2714	3.3224*	2.08
B (Boys vs. Girls)	1	9553.4492	9553.4492	5.3425*	2.71
A x B	3	10026.4233	3342.1411	1.8690	
Error	346	618715.8189	1788.1960		
Total	353	656119.5057			

*p <.05

Table 48

Analysis of Variance on Total Sentences of Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	$F_{.90}$
A (PLDK)	3	131.1630	43.7210	1.7003	2.08
B(Boys vs. Girls)	1	146.8475	146.8475	5.7111**	2.71
A x B	3	167.2308	55.7436	2.1679*	2.08
Error	346	8896.5102	25.7124		
Total	353	9341.7515			

*p <.05
**p <.01

Table 49

Analysis of Variance on Words Per Sentence of Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	7402.8357	2467.6119	3.1573*	2.08
B (Boys vs. Girls)	1	1294.7146	1294.7146	1.6566	2.71
A x B	3	1986.9727	662.3242	0.8474	2.08
Error	346	270412.1352	781.5379		
Total	353	281096.6582			

*p <.05

Table 50

Analysis of Variance on Syntax Quotient Scores of Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	568118.1198	189372.7066	3.0669*	2.08
B (Boys vs. Girls)	1	492203.3899	492203.3899	7.9713**	2.71
A x B	3	108647.2423	36215.7474	0.5865	2.08
Error	346	21364414.9317	61746.8639		
Total	353	22533383.6837			

*p <.05
**p <.01

Table 51

Analysis of Variance on Abstract-Concrete Scores of Myklebust's Written Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	220.1734	73.3911	2.7891*	2.08
B (Boys vs. Girls)	1	126.9605	126.9605	4.8250*	2.71
A x B	3	40.3922	13.4640	0.5116	2.08
Error	346	9104.1915	26.3126		
Total	353	9491.7176			

*p <.05

the written language measure, there appeared to be a trend for those children receiving one year of PLDK (W/1) to be superior to the other groups--almost a complete reversal of the Written Picture Story Language Test.

The analyses of variance or the oral language data appear in Tables 53 through 56.

There were two significant main effects on the PLDK dimension--on words per sentence measure and degree of abstraction. In both cases, the W/1 PLDK group was significantly superior to the W/O PLDK and control groups. Too, for the words per sentence measure, both the W/1 and W/2 groups were superior to the control group.

In terms of a main effect on boys vs. girls, two of the four measures--for total words and words per sentence--were significantly in favor of the girls (106.62 vs. 93.26, and 10.46 vs. 9.65 respectively),

Table 52

Mean and Standard Deviation Follow-up Raw Scores on the Oral Picture Story Language Test

Treatment Group	N	Total Words		Total Sentences		Words/Sentence		Abstract-Concrete	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
Without PLDK (W/O)									
Boys	51	87.63	51.42	8.90	4.46	9.68	2.23	9.33	3.06
Girls	51	103.55	65.01	10.39	6.43	10.04	1.94	9.57	2.93
Total	102	95.59	58.87	9.65	5.56	9.86	2.09	9.45	2.98
One Year PLDK (W/1)									
Boys	51	105.47	56.47	10.47	4.42	9.90	2.05	10.75	3.50
Girls	51	107.53	55.76	9.61	4.54	11.27	3.02	10.63	3.14
Total	102	106.50	55.85	10.04	4.48	10.59	2.66	10.69	3.31
Two Years PLDK (W/2)									
Boys	51	95.43	48.84	9.75	4.37	9.83	2.17	10.02	3.04
Girls	51	110.22	117.22[a]	10.37	9.64	10.45	2.42	9.82	2.92
Total	102	102.82	89.66	10.06	7.45	10.14	2.31	9.92	2.97
Control (C)									
Boys	24	74.67	39.01	8.04	3.14	8.66	2.44	9.71	3.47
Girls	24	103.54	49.24	10.50	4.08	9.68	1.65	9.42	2.65
Total	48	89.10	46.31	9.27	3.81	9.17	2.12	9.56	3.06
Grand Total									
Boys	177	93.26	51.33	9.48	4.31	9.65	2.21	9.99	3.26
Girls	177	106.62	79.45	10.18	6.80	10.46	2.45	9.93	2.97
Total	354	99.94	67.12	9.83	5.70	10.06	2.36	9.96	3.11

[a]The scores within this treatment group ranged from 35 to 757 words.

Table 53

Analysis of Variance on Total Words of the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	12805.1241	4268.3747	0.9494	2.08
B (Boys vs. Girls)	1	15786.7118	15786.7118	3.5113*	2.71
A x B	3	6364.4068	2121.4689	0.4718	2.08
Error	346	1555566.3901	4495.8566		
Total	353	1590522.6328			

*p <.10

Table 54

Analysis of Variance on Total Sentences of the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	28.2251	9.4083	0.2886	2.08
B (Boys vs. Girls)	1	42.7373	42.7373	1.3113	2.71
A x B	3	115.4305	38.4768	1.1806	2.08
Error	346	11276.0959	32.5898		
Total	353	11462.4888			

Table 55

Analysis of Variance on Words Per Sentence of the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	7089.3711	2363.1237	4.4747*	2.08
B (Boys vs. Girls)	1	5873.9078	5873.9096	11.1228*	2.71
A x B	3	1480.7031	493.5677	0.9346	2.08
Error	346	182721.2723	528.0961		
Total	353	197165.2543			

*p < .01

Table 56

Analysis of Variance on the Abstract-Concrete Scores of the Oral Picture Story Language Test

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	$F_{.90}$
A (PLDK)	3	87.9636	29.3212	3.0460*	2.08
B (Boys vs. Girls)	1	0.3418	0.3418	0.0355	2.71
A x B	3	3.4239	1.1413	0.1185	2.08
Error	346	3330.6352	9.6261		
Total	353	3422.3645			

*p < .05

Finally, none of the interactions between PLDK treatments and the sex of pupil variable attained statistical significance.

In light of the above results, the following can be concluded from the Oral Picture Story Language Test:

a) One year of PLDK lessons was superior to no PLDK, but no differences appeared between children with one and two years of PLDK exercises.

b) On half the measures, the girls were significantly superior to the boys in oral story telling.

SUMMARY AND CONCLUSIONS

The two-year Cooperative Reading Project (CRP) was an outgrowth of our earlier Cooperative Language Development Project (CLDP). In the Cooperative Language Development Project, we investigated, with Southern disadvantaged children in the primary grades, the efficacy of the Initial Teaching Alphabet (ITA) in teaching beginning reading, and Levels #1, #2, and #3 of the Peabody Language Development Kits (PLDK) in stimulating oral language, verbal intelligence, creative thinking, and school achievement. The experiment proper extended over the first three grades when the posttest measures were obtained. The children were followed up through their fourth grade. While much of the earlier pupil progress was later lost at the time of followup testing, the results at interim and posttesting were very positive, with the ITA and PLDK treatment groups being generally more advanced than the controls, especially for children who had ITA in combination with two or three years of PLDK lessons. On the basis of these positive results, it might have been concluded that a

language program using ITA plus PLDK should be incorporated into school programs for disadvantaged children. However the possibility existed that these results may have been due to a number of factors beyond the control of the project staff. Since school assignments to experimental treatments were made by the central office staff of the school system, selection bias may have been inadvertently introduced. Too, within each school, only volunteer teachers were included. Moreover, the Hawthorne Effect cannot be ignored. The experimental teachers were given a number of incentives which were not available to the control teachers--including a small salary supplement, in-service training sessions, consultative services, as well as the stimulation created by the novelty of being involved in the experimental treatments. Furthermore, frequent visits to the experimental classes were made by researchers, school officials, and visitors who praised the pupils' progress. The question thus arises as to whether the Initial Teaching Alphabet and the Peabody Language Development Kit materials would continue to be effective when this study was replicated with other teachers, and with other approaches to beginning reading where similar extra support and incentives were included. The central purpose of the Cooperative Reading Project (CRP) was to deal with this question. As in the first study, subjects were disadvantaged children from inner-city primary grades, about 80 per cent of whom were Negro. With teacher incentives and support equated, the relative effectiveness of three experimental approaches to teaching beginning reading was compared. Also, the influence on language development of a program of oral language stimulation which continued through grades one and two was studied. The three experimental reading treatments were:

a) the Initial Teaching Alphabet (ITA), b) the Words-in-Color program (WIC), and c) a Supplemented Conventional Reading Program (SCRP) which consisted of a basic reader plus the Hay-Wingo phonic materials. All three reading approaches tended to be phonetically rather than look-and-say oriented. In addition to the reading treatment, some of the experimental subjects received oral language stimulation in the first grade from Level #1 of the Peabody Language Development Kits, while others received still a second year of treatment from Level #2 of these same series of Kits.

From 12 public elementary school in the inner-city area a total of 538 subjects--473 in the combined experimental group and 65 controls constituted the subject pool. Since the treatments were provided by the classroom teachers to the entire class, treatment groups were neither equal in number nor on certain other important attributes. Thus, selected samples were drawn from the entire group for purposes of statistical analysis.

Nine experimental treatment groups and a control group were established, each consisting of three teachers who were committed to keep their pupils through both of the first two grades: a) Group 1 used ITA followed by the Lippincott Basic Readers without PLDK, b) Group 2 used ITA followed by the Lippincott Basic Readers, plus one year of PLDK, c) Group 3 used ITA followed by the Lippincott Basic Readers, plus two years of PLDK, d) Group 4 used WIC followed by the Houghton Mifflin Basic Readers without PLDK, e) Group 5 used Words-in-Color followed by the Houghton Mifflin Basic Readers, plus one year of PLDK, f) Group 6 used WIC followed by Houghton Mifflin Basic Readers and the Hay-Wingo

phonic materials without PLDK, g) Group 8 used the Houghton Mifflin Basal Readers and the Hay-Wingo phonic materials plus one year of PLDK, h) Group 9 used the Houghton Mifflin Basal Readers and the Hay-Wingo phonic materials, plus two years of PLDK, and i) Group 10 was a control group which did not receive the experimental program. (Many of the control children came from the only elementary school in the district accredited by the Southern Association of Colleges and Schools. It is possible that the experimental treatments could be expected to do little more than equalize this bias.)

The effectiveness of the program was evaluated by means of six measures: a) general intellectual functioning with the 1960 Stanford-Binet Intelligence Test, b) psycholinguistic development with the experimental edition of the Illinois Test of Psycholinguistic Abilities, c) creative thinking with the Torrance Tests of Creative Thinking, d) scholastic achievement with the Metropolitan Achievement Tests, e) written language development with Myklebust's Written Picture Story Language Test, and f) oral language development with a project-developed Oral Picture Story Language Test. The pretesting was done at the outset of the 1965-66 school year; the posttesting was completed in the Spring, 1967; the followup testing was done in the Spring, 1968. At time of followup testing, data were obtained on 354 subjects--306 in the experimental treatment and 48 in the control group. These data were analyzed using analyses of variance, with t-tests used on significant main effects and interactions.

The data were first examined using a 3 x 3 x 2 factorial analysis of variance to contrast the three experimental reading programs in

combination with the three oral language stimulation treatments by sex. (No control subject data were included in this treatment of the data.) The following six findings resulted:

a) In terms of IQ scores on the 1900 Stanford-Binet Intelligence Test, neither at posttesting nor followup testing did the PLDK exercises have a differential effect with all groups increasing significantly from pre- to post-testing; a shocking finding was that the IQ scores generally had fallen back to initial levels by time of followup testing.

b) In terms of overall LA scores on the Illinois Test of Psycholinguistic Abilities, generally the PLDK lessons did not prove effective in raising LA scores.

c) In terms of total verbal subtest scores on the Torrance Tests of Creative Thinking, both one and two years of PLDK exercises resulted in significantly improved performance.

d) In terms of total written language subtest scores on the Metropolitan Achievement Tests, the SCRP treatment was superior at the end of the two-year experimental period, but this differential was lost by time of followup; only slight evidence was found that the PLDK lessons tended to equalize pupil progress of boys to the level attained by the girls.

e) On Myklebust's Written Picture Story Language Test, little evidence was found to support the effectiveness of the PLDK lessons.

f) On our Oral Picture Story Language Test, at followup, children with one year of PLDK exercises performed significantly better than those without, or with two years of such lessons.

The data were analyzed a second time using a 4 x 2 analysis of variance to contrast the three experimental PLDK conditions plus the control group, by the sex-of-pupils dimension. The findings closely paralled those of the first analysis. Only important new information is outlined below:

a) In terms of IQ scores, no new information was obtained.

b) In terms of language age scores on the ITPA, all three experimental PLDK conditions obtained higher followup scores than the control subjects.

c) No new information was obtained concerning scores on the Torrance Tests of Creative Thinking.

d) In terms of written language scores on the Metropolitan Achievement Tests, at the conclusion of the two-year experimental period all three experimental PLDK conditions were superior to the controls, with only the non-PLDK experimental reading group being superior to the control subjects at followup testing.

e) No new information was learned from the second analysis of scores on Myklebust's Written Picture Story Language Test.

f) In terms of scores on the Oral Picture Story Language Test, no new information was provided by the second analysis.

The results of the Cooperative Reading Project did not confirm the highly positive results obtained for ITA and PLDK in the Cooperative Language Development Project. In this second study what little advantage had existed for the Supplemented Conventional Reading Program in terms of academic achievement at time of posttesting was lost by

followup time. As for the lessons from the Peabody Language Development Kits, only scores on the Torrance Tests of Creative Thinking and on our Oral Picture Story Language Tests were enhanced by time of followup.

Explanations for these differences in findings are many. First, one cannot discount the fact that the Hawthorne Effect may have contributed appreciably to the results of the first study. Second, the two new experimental reading programs, namely Words-in-Color and the Supplemented Conventional Reading Program were conducted in schools not involved in the first experiment, whereas the ITA was conducted in the same schools as the first experiment. This may have resulted in the better teachers in the schools being selected for the first experiment. Thus, first-selected teachers in the WIC and supplemented conventional reading approaches would be competing with second-selected teachers in the Initial Teaching Alphabet approach. Finally, an examination of the differences in the mean gains across classrooms within each method indicated that teacher variability was as great as reading method variability.

Perhaps a concluding comment is in order. After devoting four years to the Cooperative Language Development Project and three years to the Cooperative Reading Project, the researchers in this investigation were forced to conclude that, without controlling for differences in teacher effectiveness, future research which attempts to discern the relative effectiveness of different methods of teaching beginning reading and/or oral language will probably continue to be futile, or the results spurious. Either such comparisons of different interventions should be

tabled until more is known about measuring and controlling for the teacher variable, or research designs should be utilized in which the teacher is kept constant across treatments. This might necessitate the use of some type of counter-balanced design in which a group of teachers would use one method for one or more years and a different method (with comparable children) for another one or more years, or in which the same teachers provide instruction in two or more experimental approaches within the same school day. Until these more sophisticated procedures and/or measures are available, it would not seem to be feasible to engage in additional studies such as this one which has consumed much of our energies over these past four years.

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