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ABSTRACT

During 1985-86 the Division of Special Education of the New York Board of Education operated a Chapter 1/P.S.E.N. Remedial Reading and Mathematics Program which served approximately 11,500 English-speaking and limited English Proficient (LEP) students. Of these, 9,627 received reading instruction alone, and 119 received remedial instruction in Spanish. In the public schools, a total of 1,978 students received instruction in mathematics, some also receiving instruction in reading. To measure academic progress English language students took standardized pre- and posttests in reading or mathematics. Consultants observed a holistic approach to reading instruction at 89 percent of the sites visited. Teachers reported favorably on the use of the computer as a motivating learning tool. They requested more materials for LEP students. Reading and math instruction was integrated through the use of word problems and vocabulary study, and an emphasis on practical skills. The student achievement objective for reading in English was not met. However, the mean normal curve equivalent gain in reading comprehension from pretest to posttest was statistically significant. The program objective for the 119 students who were taught reading in Spanish was partially met. The program objective for the students receiving remedial instruction in math was also met. The following recommendations are made for the next program cycle: (1) increase the availability of materials in the LEP and mathematics programs; (2) continue staff development, including the use of innovative materials and a holistic approach to teaching; and (3) review the appropriateness of student assignments to test levels on the Metropolitan Achievement Tests. Data are presented in nine tables. (Author/BJV)

FINAL EVALUATION REPORT

October, 1987

Robert Tobias, Administrator
Judith S. Torres, Senior Manager

CHAPTER 1/P.S.E.N. REMEDIAL READING AND MATHEMATICS PROGRAM 1985-86 END OF THE YEAR REPORT

Prepared by the O.E.A.
Special Education
Evaluation Unit

Ronald C. Miller
Evaluation Manager

Tomi D. Berney
Evaluation Specialist

Lynn Mulkey
Evaluation Associate

Frances Francois
Evaluation Consultant

New York City Public Schools
Office of Educational Assessment
Richard Guttenberg, Director

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SUMMARY OF THE REPORT

During 1885-86, the Division of Special Education (D.S.E.) of the New York Board of Education operated a Chapter 1/P.S.E.N. Remedial Reading and Mathematics Program, which served approximately 11,500 eligible English-speaking and limited English proficient (LEP) students. Of these, 9,627 received reading instruction alone, 119 of them receiving remediation in Spanish. In the public schools, a total of 1,978 students received instruction in mathematics, some also receiving instruction in reading. To measure academic progress, English language students receiving remedial instruction in reading took pre- and posttests with the Metropolitan Achievement Test (M.A.T.) in reading. LEP students participated in the Leamos Spanish Development Reading Program (Leamos) which assessed achievement on an ongoing basis. In mathematics the Individualized Criterion Referenced Test (I.C.R.T.) in math provided achievement data, also on an ongoing basis.

The Office of Educational Assessment (O.E.A.) conducted an evaluation of program implementation. The evaluation consisted of observation of the program at representative sites, as well as interviews with program staff. Analysis of these data indicated that the program was adequately implemented.

The remediation consisted of individualized diagnostic-prescriptive instruction. Reading instruction was based on a holistic, meaning-centered approach; instruction in mathematics emphasized word problems and practical skills. Consultants observed a holistic approach to reading instruction at 89 percent of the sites visited. This was a substantial increase from the previous program cycle when field consultants observed this approach at approximately 75 percent of the sites. Teachers reported favorably on the use of the computer as a motivating learning tool. They requested more materials for LEP students.

Field consultants observed the integration of reading and math instruction through the use of word problems and vocabulary study, as well as an emphasis on practical skills. At some sites teachers expressed a need for additional concrete materials.

Teachers reported favorably on the pre- and inservice staff development training. They particularly liked the introduction to the use of innovative materials and training in the implementation of the holistic reading approach. Those classroom special education teachers who did not receive pre-service or inservice training would have liked to receive such training.

The student achievement objective for reading in English was that 75 percent of the students would demonstrate a normal curve equivalent (N.C.E.) gain in reading comprehension from pretest to posttest. Of the 7,832 students for whom achievement data were complete, 55.8 percent attained this goal. Thus, the objective was not attained. Despite this outcome, the mean

N.C.E. gain for all students was statistically significant ($p < .01$).

A total of 119 students in bilingual classes were taught reading in Spanish. The program objective was that 80 percent of these students would master at least two new skills per 20 session attended, and that 30 percent would master at least five new skills per 20 sessions attended. Of the total number of students, 95.8 percent achieved the first part objective (two skills) and 18.5 percent achieved the second part (five skills). Thus, the objective was partially met.

The program objective for math was that 80 percent of the students would master new math skills at the rate of two per 20 sessions attended, and 30 percent would master five or more new math skills at the same rate. The objective was met in that 89.2 percent mastered two skills per 20 sessions and 52.3 percent mastered at least five skills per 20 sessions attended.

Recommendations for the next program cycle are:

- Increase the availability of materials in the LEP and mathematics programs.
- Continue the staff development, making sure to include the use of innovative materials, as well as the holistic approach to reading instruction.
- Review the appropriateness of student assignments to test levels on the M.A.T. to determine whether a different level (or test) might be appropriate. It might be wise to carefully study the total testing problem in special education so as to avoid improper test level selection.

ACKNOWLEDGEMENTS

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I. INTRODUCTION

This report documents the Office of Educational Assessment's (O.E.A.'s) evaluation of the 1985-86 Chapter 1/P.S.E.N. Remedial Reading and Mathematics Program. Administered by the Division of Special Education (D.S.E.), the program was designed to provide supplementary reading and mathematics instruction to eligible English-speaking and limited-English proficient (LEP) special education students at 202 public and 11 nonpublic schools.

INSTRUCTIONAL MODEL

The reading instruction utilized a holistic, meaning-centered approach. It consisted of an integrated process embracing the development of listening, speaking, and writing skills, and utilized students' personal experiences. The math instruction focused on computation, numeration, practical skills, and the integration of reading and math through the use of word problems and the study of relevant vocabulary.

The public school component used a whole-class model of instruction. An entire class either traveled as a unit with its participating classroom teacher to join the Chapter 1 teacher in a program laboratory, or else the program teacher traveled to different special education classrooms. The whole-class model was designed to retain class integrity, facilitate the integration of basic and remedial instruction, and provide training to classroom teachers.

The 11 nonpublic schools used an individual or small-group pull-out model in which students received program instruction outside their classrooms for a minimum of 90 minutes per week.

STAFF

The staff for the Chapter 1 program consisted of one program manager, six coordinators, 13 assistant coordinators, and 208 teachers. The program manager coordinated program activities, oversaw budget issues, kept records, served as O.E.A. liaison, presented the program to the Parent Advisory Council, and supervised the program coordinators.

The six coordinators managed the day-to-day operation of the program. Assistant coordinators had responsibility for providing training and assistance to both program and participating classroom teachers. The 208 program teachers were responsible for on-site implementation of the program, including student assessment, program-related instruction, and recordkeeping. A remediation team consisting of a program teacher and a special education classroom teacher provided the instruction. They taught reading in the language normally used in the classroom.

PARTICIPATING STUDENTS

The target population consisted of 11,602 eligible students in self-contained special education classes ranging in age from seven to 21 years at 213 community, special, and nonpublic schools. A total of 9,627 students (83.0 percent of the total)

received instruction in reading alone; 119 (one percent) of these received reading instruction in Spanish; 1,641 (14.1 percent) received instruction in both reading and math, and 334 (2.9 percent) received only math instruction.

Public School Population Receiving Reading Instruction in English

The largest number of program participants (9,329) received reading instruction in English in the public schools which were distributed throughout the five boroughs. Forty-five percent attended elementary schools, 53 percent attended intermediate or junior high schools, and two percent attended high schools. Their age ranged from seven to 21 years.

LEP Public School Population

One-hundred nineteen LEP students received only reading instruction in Spanish at five sites, three in Manhattan and two in the Bronx. All students attended elementary schools. Their age ranged from seven to 13 years.

Nonpublic School Population

Participating nonpublic school students received reading instruction only through the D.S.E. Office of Citywide Services.* A total of 179 students were served at eight nonpublic schools.

*These are centrally operated programs serving severely handicapped students whose numbers are small.

ORGANIZATION OF THE REPORT

The arrangement of chapters in this report is as follows: Chapter II describes the program methodology; Chapter III presents the quantitative and qualitative findings focusing or instructional activities, pupil achievement and program implementation; Chapter IV offers conclusions and recommendations based upon the results of the evaluation.

II. EVALUATION METHODOLOGY

EVALUATION QUESTIONS

The evaluation sought to answer questions in the areas of program implementation and student achievement. Evaluation questions included the following:

- What was the level of program implementation?
- What was the quality of program implementation?
- Did program teachers use the holistic approach to teach reading?
- Did program teachers stress life skills in their math instruction?
- What changes have program personnel instituted in the present program cycle?
- What was the average normal curve equivalent gain achieved by students?
- What facilitated the program's effectiveness?
- What, if anything, detracted from the program's effectiveness?

To assess program implementation, O.E.A. field consultants observed instruction, reviewed program and student records, and interviewed program and school staff at 35 program sites (16 percent). O.E.A. selected the sample sites according to region, district, school level, program service categories and program component.

Consultants observed 81 class periods and interviewed 35 program teachers, 62 special education classroom teachers, and 34 school-level administrators (principals, assistant principals,

and special education site supervisors). Field consultants recorded implementation data on O.E.A.-developed interview and observation schedules. Interviews and observations focused on instructional strategies and materials, staff collaboration, and staff development.

INSTRUMENTS

To assess program outcomes, O.E.A. collected information on student data retrieval forms, on which Chapter 1 teachers entered program, student, and achievement information. The Metropolitan Achievement Test (M.A.T.)* was used to measure English-language reading achievement; the Leamos Diagnostic/Prescriptive Tests (Leamos) provided Spanish-language reading achievement data.** The Math Individualized Criterion Referenced Test (I.C.R.T.) was used to measure achievement in mathematics.***

O.E.A. collected information about program implementation and factors which contributed to, or detracted from, the program's success on interview schedules administered to program teachers, special education classroom teachers, school administrators, program coordinators, and assistant coordinators. Similarly, field consultants used classroom observation forms to document additional program information.

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*Forms JS and KS, 1978 Survey Edition. San Antonio, Texas: The Psychological Corporation.

**Spanish Developmental Reading Task Force, Los Angeles Unified School District (Paul Amidon and Associates), 1976.

***Tulsa, Oklahoma: Educational Progress (Educational Development Corporation), 1980.

III. EVALUATION FINDINGS

IMPLEMENTATION

Chapter 1/P.S.E.N. provided supplementary remedial reading and mathematics instruction to eligible students in public and nonpublic schools. Students received instruction from a remediation team consisting of a program teacher and a special education classroom teacher.

Reading Instruction

O.E.A. consultants observed that the holistic approach to reading instruction was in use at 31 of the 35 sites visited (89 percent). This represented an increase from the previous cycle, when approximately 75 percent of the observed sites were employing this technique at the time of observation. Observers noted the following features of lessons and instructional strategies consistent with the holistic approach: writing activity; preparatory vocabulary work; reading in the content areas; critical thinking; use of poetry and drama; and discussions of literature, current events (through the reading of magazines and newspapers), and students' personal experiences relevant to the reading assignments.

Field consultants documented the integration of a writing activity with a reading lesson at 22 sites (63 percent). Several of the teachers at these schools used the "writing process approach." First they discussed a topic with students and encouraged them to "brainstorm;" then the students wrote a first

draft of a composition on the subject, edited it, and rewrote it.

As in previous program cycles, teachers used a wide variety of reading materials, both commercial and teacher-made. A change in the current cycle, however, was the introduction of word processors at five sites. Program teachers reported that students liked using the computers, especially for writing original stories. Teachers felt computers increased the students' motivation.

Students as young as age seven received remedial instruction. Some teachers taught phonics with nursery rhymes to this group; others used poetry and fairy tales which the children dramatized. A few teachers worked on letter recognition skills with alphabet cards.

Most program teachers of English-speaking students used the M.A.T. pretest results for instructional planning and grouping and reported that it was suited to a holistic approach. Some, however, indicated that it was not specific enough to be used alone, and that it needed to be supplemented by teacher judgment and informal reading inventories. Several teachers and program administrators pointed out that the recommended use of the Primer test level resulted in a more accurate assessment of the reading levels of lower-functioning students than had been previously possible. In addition, fewer teachers in the current cycle than the current cycle reported difficulties in determining pretest levels for their students.

Teachers and administrators frequently reported the following program strengths: individualization of instruction; variety and relevance of instructional materials; emphasis on writing, critical thinking, and use of students' own experiences.

Program teachers teaching reading in Spanish reported that Leamos guided instructional planning to some extent, but that an instrument more suited to the holistic approach would be preferable. Program staff pointed to an inadequate supply of materials for LEP students as being a problem.

Math Instruction

O.E.A. consultants who observed math classes reported that teachers integrated reading with math instruction through the use of word problems and the study of vocabulary. They observed this integration during nearly all class periods. Teachers also emphasized practical skills and the use of concrete materials in almost all classes. Consultants observed teachers using a wide variety of math materials, including abstract and representational items as well as concrete manipulatives.

Program teachers reported that they used Math I.C.R.T. results for instructional planning and grouping, and supplemented this information with a variety of informal assessment methods. They stated that they were able to identify accurately their students' specific strengths and weaknesses.

Program and school staff specifically praised the opportunity for individualized instruction, the variety of the materials, the integration of reading and math, the emphasis on

practical skills, and the effective use of concrete manipulatives. The only major weakness they noted was the shortage, at some sites, of concrete materials.

Non-instructional Staff Activities

Record Keeping. Field consultants reviewed program records and found them to be well-maintained and complete; they included test results, lesson plans, and samples of students' work. A substantial number of program and classroom teachers, coordinators, and school administrators stated that the program record-keeping requirements were excessive and duplicated the same information in the prescriptive logs and lesson plans.

Staff Collaboration. O.E.A. assessed staff collaboration and utilization by examining responses to interview questions and observing classroom lessons. Cooperative planning among staff, both in and out of class, was apparent. Most respondents indicated that the whole-class model facilitated this collaboration. The full utilization of classroom teachers during instructional periods was not always in evidence, however.

Staff Development. Inservice training for program teachers occurred during the monthly workshops held in each region. Most teachers reported that these workshops were excellent and exposed them to the most current instructional strategies and materials. Teachers reported that training on the implementation of the holistic reading approach was especially useful. They also

valued presentations by other teachers and the opportunity to share ideas on new teaching approaches.

Another type of inservice training was on-site consultation by the coordinating staff. Teachers said they appreciated the individual assistance and availability of the coordinating staff. Several teachers requested that staff development in reading instruction include more strategies for working with low-functioning and beginning readers. They requested that the staff development in math cover additional topics such as fractions, decimals, graphs, and geometry.

A training priority in Chapter 1 has been pre- and inservice training of special education classroom teachers. Forty-four of the 62 participating classroom teachers interviewed (71 percent) reported that they received a satisfactory orientation to the program in the fall. Of the teachers who had not received preservice training, most regretted not having received it. Thirty-eight classroom teachers (61 percent of those interviewed) indicated they had received inservice training. Almost all of those who had not received it expressed an interest in receiving it the following year. Teachers considered the following topics to be particularly useful: new instructional materials; grouping students; the holistic approach to reading; individualized instruction; using test results to guide instructional planning; writing strategies; and specific topics in math such as measurement, decimals, and word problems. Teachers expressed an interest in further training in these areas and also in the

following: teaching low-level readers, teaching phonics, and teaching math through the use of concrete-manipulative materials. Although teachers were generally positive in their analysis of their training, they recommended that Chapter 1 staff offer more on-site workshops, make more effective use of the whole class model for training, and provide individual training during preparation periods and other available times.

Parent Education and Involvement

As in previous cycles, parent workshops were held at the school, regional, and central levels. As before, attendance was variable, but generally low. The parent programs focused on reviewing activities related to Chapter 1 and other reimbursable programs in special education. Teachers communicated with parents during open school week and as needed throughout the year.

Student Instruction

Scheduling of instruction was the same as in previous cycles. Students receiving reading-only services participated in four or five 45-minute sessions per week. Students who received both reading and math instruction participated in three 45-minute sessions per week in each subject. Those students attending non-public schools received at least 90 minutes of reading instruction per week. A summary of sessions scheduled and sessions attended is presented in Table 1. Students receiving reading and math instruction had the highest attendance rates.

TABLE 1

Chapter 1/P.S.E.N. Sessions Scheduled and Attended

Instructional Content	Number of Students	Mean Number of Sessions Scheduled	Mean Percent of Sessions Attended
Reading Only			
English-speaking public	9,329	94.9	77.6
English-speaking nonpublic	179	46.1	74.3
LEP public	119	117.1	83.6
TOTAL	9,627	94.3	77.6
Math			
Reading and Math	1,641	63.0	84.0
Math Only	334	81.8	83.6
TOTAL	1,975	66.2	83.9

- The greatest number of sessions were scheduled for LEP students.
- Attendance was lowest for English-speaking students receiving reading-only instruction.

Students receiving reading instruction in Spanish had higher attendance rates than did students receiving reading instruction in English. The attendance for the English-speaking public school students receiving only reading instruction (the largest group served) was slightly lower (77.6 percent) than it was in the previous cycle (81.7 percent).

ACHIEVEMENT DATA

English Reading Achievement

The program objective for students receiving reading instruction was:

- By June 30, 1986, 75 percent of the Chapter 1/P.S.E.N. target population receiving remedial reading instruction will demonstrate a normal curve equivalent (N.C.E.) gain in reading comprehension from pretest to posttest, as measured by the M.A.T. in reading.

For the purpose of determining program success, and in accordance with the proposal, only those students who attended a minimum of 20 days were included when assessing achievement outcomes. O.E.A. combined English reading scores form public and non-public school students in the analysis as there was no differentiation in the program objective.

There were 7,832 English-speaking public and non-public school students for whom achievement data were complete (70.2 percent of the total). Data were missing from those attending fewer than 20 days, late admits, and those dropping out early. Achievement data showed that overall 55.8 percent of the students

TABLE 2

Students' N.C.E. Gains on the M.A.T. in Reading, by Test Level

Test Level	N	Percent of Students Showing a Gain
Primary 1	2,111	32.6
Primary 2	2,025	62.8
Elementary	2,128	57.9
Intermediate	1,283	75.7
Advanced	285	72.6
ALL LEVELS	7,832	55.8

- Overall, 55.8 percent of the students showed an N.C.E. gain.
- Students tested at the Intermediate level had the highest percentage showing an N.C.E. gain.

demonstrated an N.C.E. gain in reading comprehension, indicating that the program objective was not attained. (See Table 2.)

Within test levels, O.E.A. analyzed the statistical significance of mean N.C.E. gains by using the correlated t-test model, and calculating effect sizes*. (See Table 3). The mean N.C.E. gain for the entire group of 2.9 was statistically significant and represented a small effect size of .24. The mean N.C.E. gain was therefore only slightly educationally meaningful.

Intermediate school students demonstrated the highest percentage of students showing improvement (61.1 percent) (see Table 4); they also had the largest N.C.E. gain (4.0), as well the most educationally meaningful gains indicated by the effect size. (See Table 5.) The large standard deviations of the mean gains suggest that the groups of students tested are very heterogeneous, with some students making large gains and others showing N.C.E. losses.

Reading Results for LEP Students

The program objective for students receiving reading instruction in Spanish was:

- By June 30, 1986, 80 percent of the bilingual Chapter 1/ P.S.E.N. population receiving remedial reading instruction in Spanish will master at least two new skills per 20 sessions attended, and that 30 percent will master at

*The effect size, developed by Jacob Cohen, is a ratio of the mean gain to the standard deviation of the gain. This ratio provides an index of improvement in standard deviation units irrespective of the size of the sample. Effect size (E.S.) is interpreted to indicate educational meaningfulness, and an E.S. of .80 is thought to be highly meaningful, while one of .2 is considered to be only slightly so.

TABLE 3

Significance and Effect Size of
N.C.E. Gains on the M.A.T. in Reading, by Test Level

Level	Number of Students	Mean N.C.E. Gain (Loss)	Standard Deviation	t	Effect Size
Primary 1	2,111	(-2.6)	13.8	(-8.6*)	(-.18)
Primary 2	2,025	4.4	10.9	18.0*	.40
Elementary	2,128	4.0	11.0	17.0*	.37
Intermediate	1,283	6.8	10.8	22.8*	.62
Advanced	285	7.8	11.6	11.3*	.65
ALL LEVELS	7,832	2.9	12.3	21.2*	.24

*$p < .01$

- Mean differences ranged from a loss of 2.6 N.C.E.s at the Primary 1 level to a gain of 7.8 at the advanced level.
- All mean differences were statistically significant.
- N.C.E. gains of students tested at the intermediate and advanced levels showed moderate effect sizes, suggesting moderate educational meaningfulness.

TABLE 4

English-Speaking Public School Students'
N.C.E. Gains on the M.A.T. in Reading, by School Level

School Level	Total Number of Students	Percent of Students Showing a Gain
Elementary	3,562	50.6
Intermediate	3,746	61.1
Junior High	384	52.9
High School	140	55.7
ALL LEVELS	7,832	55.8

- The intermediate school group had the highest percent of students showing an N.C.E. gain.
- At least half of the students at all levels showed an N.C.E. gain.

TABLE 5

Significance and Effect Size of
N.C.E. Gains on the M.A.T. in Reading, by School Level

Level	Number of Students	Mean N.C.E. Gain	Standard Deviation	t	Effect Size
Elementary	3,562	1.8	12.4	8.5*	.15
Intermediate	3,746	4.0	11.9	20.7*	.34
Junior High	384	2.8	13.4	4.1*	.21
High School	140	3.9	13.0	3.5*	.30
ALL LEVELS	7,832	2.9	12.3	21.2*	.24

*$p < .01$

- Mean N.C.E. gains ranged from 1.8 at the elementary level to 4.0 at the intermediate level.
- All gains were statistically significant, but the associated effect sizes were small.
- Students attending intermediate schools showed the most meaningful N.C.E. gains.
- The large standard deviations of the mean gains suggest that the performance of the student groups tested was very heterogeneous.

least five new skills per 20 sessions attended as measured by ongoing administration of the Leamos.

For the purpose of determining program success, only those students attending a minimum of 20 days were included in the computation of mastery data.

Data analysis indicated that 95.8 percent of the students (114) mastered at least two skills in 20 sessions and 18.5 percent (22) mastered five or more skills per 20 sessions. Thus, the first part of the objective was met, while the second part was not (see Table 6). Nevertheless, mastery was substantial with over 75 percent of the students mastering at least 12 skill objectives (see Table 7).

Math Achievement

Instruction in mathematics was given to 1,978 students. Complete achievement data were available for 1,975. The objective for students receiving math instructions was:

- By June 30, 1986, 80 percent of the students receiving remedial math instruction will master two new math skills per 20 sessions attended and 30 percent will master at least five new skills per 20 sessions attended as measured by ongoing administration of the I.C.R.T.

An analysis of achievement data indicated that both parts of the objective were met. Eighty-nine percent mastered at least two new skills objectives per 20 sessions attended, and 52 percent mastered at least five skill objectives per 20 sessions attended. (See Table 8.) The mean number of skills objectives mastered was 4.8 (S.D. = 1.5) per 20 sessions attended. Just

TABLE 6

Frequency Distribution of Mastery Rates of Leamos Skills

Mastery Rate[a]	Number of Students	Relative Percent	Cumulative Percent
5 or more	22	18.5	18.5
4	12	10.1	28.6
3	25	21.0	49.6
2	55	46.2	95.8
1	1	.8	96.6
less than 1	4	3.4	100.0
TOTAL	119	100.0	

[a]Number of skills mastered per 20 sessions attended.

- Over 95 percent of LEP students tested in Leamos had mastery rates of at least two skills per 20 sessions attended.
- About 18 percent of LEP students had mastery rates of at least five skills per 20 session attended.

TABLE 7

Frequency Distribution of Total
Leamos Skills Mastered
(N = 119)

Number of Objectives Mastered	Number of Students	Relative Percent	Cumulative Percent
21 - 24	14	11.7	11.7
17 - 20	12	10.7	21.7
13 - 16	16	13.3	35.0
9 - 12	52	43.3	78.3
5 - 8	17	15.0	93.3
1 - 4	4	3.3	96.6
0	4	3.3	100.0

- The largest proportion of program students (43 percent) mastered nine - 12 objectives.
- Over 78 percent of the students mastered nine or more objectives.

TABLE 8

Frequency Distribution of Mastery Rates of I.C.R.T. Math Skills

Mastery Rate[a]	Number of Students	Relative Percent	Cumulative Percent
5 or more	1,032	52.3	52.3
4	261	13.2	65.5
3	229	11.6	77.1
2	238	12.1	89.2
1	121	6.1	95.3
less than 1	93	4.7	100.0
TOTAL	1,974	100.0	

[a]Number of skills mastered per 20 sessions attended.

- Over 89 percent of the students mastered at least two new skills per 20 sessions attended.
- Over 52 percent mastered at least five new skills per 20 sessions attended.

under 50 percent of the students mastered 26 or more objectives, and 78 percent mastered 17 or more. (See Table 9.) The mean number of skills mastered was 26.9 (S.D. = 12.8).

Math Achievement by Skill Area

The Math I.C.R.T. is divided into six skill areas requiring differing math knowledge, operations, and concepts. Whole number operations, fractions, and decimal and percentage sections measure knowledge of mathematical concepts, numeration, arithmetic operations, and problem-solving skills. Measurement skill areas assess competency in length, size, area, and volume. Geometry includes work in spatial concepts, lines, angles, shapes, and solids. Problems in special topics involve money, graphs, tables, time and Roman numerals. As in the previous cycle, over half (57.8 percent) of the skills mastered were in the area of whole number operations.

TABLE 9

Frequency Distribution of Total I.C.R.T. Math Skills Mastered

Number of Objectives Mastered	Number of Objectives	Relative Percent	Cumulative Percent
26 or more	977	49.4	49.4
21 - 25	342	17.2	66.6
17 - 20	225	11.4	78.0
13 - 16	150	7.5	85.5
9 - 12	94	4.8	90.3
5 - 8	71	3.6	93.9
1 - 4	79	4.0	97.7
0	38	1.9	99.8
TOTAL	1,976	99.8	

- Almost 50 percent of the students mastered 26 or more objectives.
- About two percent failed to master any new skills.

IV. CONCLUSIONS AND RECOMMENDATIONS

The Division of Special Education's Chapter 1/P.S.E.N. Individualized Reading and Math Services Program provided supplementary remedial reading and math instruction to eligible students in public and non-public schools. Students received individualized diagnostic-prescriptive instruction from a remediation team consisting of a program teacher and special education classroom teacher. Program teachers used a holistic, meaning-centered approach to teach reading and emphasized the integration of students' personal experiences in reading and writing. Instruction in math stressed word problems and practical skills.

The Office of Educational Assessment conducted an evaluation of the program's implementation and outcomes. Analysis of implementation data from program observations, staff interviews, and program records indicated that the program was satisfactorily implemented at all sites visited. Major implementation findings included the following: more program teachers employed a holistic approach to teaching reading than they had in the previous cycle; teachers integrated reading and math instruction by using word problems and emphasizing practical skills; teachers effectively utilized a wide variety of instructional materials; and, program teachers reported that staff development continued to be excellent. While there appeared to be more training of special education classroom teachers than there had been in the preceding year, many program and classroom teachers recommended

that there be an even greater emphasis on training for classroom teachers.

Of the 7,832 English-speaking public and nonpublic school students who had scores for both the pre- and posttest on the M.A.T. in reading, 55.8 percent showed an N.C.E. gain, falling short of the program objective that 75 percent would show a gain. Despite this outcome, the overall mean N.C.E. gain of 2.9 points was statistically significant ($p < .01$); the E.S. was small, suggesting that participants made gains overall, but these gains were of limited educational significance.

The heterogeneity of student N.C.E. gains seen on Table 5 also indicates that, for some students, the test they took may not have been as appropriate as would be desired. For some, a higher or lower level, or a different test might have been preferable. This is a problem not unfamiliar in special education testing. Classes with students at several grade levels and use of varying test modifications make selection of appropriate test level difficult.

Using Leamos, over 95 percent of the LEP students had mastery rates of at least two skills per 20 sessions attended and over 18 percent had a rate of at least five skills per 20 sessions attended, meeting the program objective that 80 percent would master at least two skills per 20 sessions. The objective that 30 percent would master five skills per 20 sessions attended was not met. However, these results represent an improvement over the previous program cycle, when neither of these objectives

was met.

In math, the ongoing administration of the I.C.R.T. measured pupil achievement. Over 89 percent of the students showed a mastery rate of at least two skills per 20 sessions attended, and over 52 percent mastered at least five skills per 20 sessions attended. The achievement objective was completely attained, as it was in the previous program cycle. Overall, the mean number of skills mastered in mathematics was 26.9 (S.D. = 12.8).

The conclusions, based upon the findings of this evaluation, lead to the following recommendations:

- Increase the availability of materials in the LEP and mathematics programs.
- Continue staff development, making sure to include the use of innovative materials, as well as the holistic approach to reading instruction.
- Review the appropriateness of student assignments to test levels on the M.A.T. to determine whether a different level (or test) might be appropriate. It might be wise to carefully study the total testing problem in special education so as to avoid improper test level selection.