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ABSTRACT

The Corrective Mathematics Services Program for Disadvantaged Pupils in Nonpublic Regular Day Schools, funded under Title I of the 1965 Elementary Secondary Education Act, was proposed to serve approximately 14,032 poverty area children who attended 165 non-public regular day schools. Those children were eligible for these services whose score on a standardized test in mathematics was more than one standard deviation below the grade norm. Corrective services were provided by licensed teachers from the New York City Board of Education as an in-school program during the regular school hours. In addition, a room was made available by the non-public school. Teachers were to be given in-service training and instructional material and necessary equipment were to be provided. Most children were to receive instruction in groups of approximately ten pupils. Two stated objectives of the program were as follows: (1) Pupils in grades two and three in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three to eight months ceteris paribus. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics. (2) Pupils in grades four, five and six enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. (Author/JM)

Function Number: 920644

AN EVALUATION OF THE CORRECTIVE MATHEMATICS SERVICES FOR DISADVANTAGED PUPILS IN NON-PUBLIC SCHOOLS

ESEA TITLE I PROGRAM

Evaluation of a New York City school district educational project funded under Title I of the Elementary and Secondary Education Act of 1965 (PL 89-10), performed under contract with the Board of Education of the City of New York for the 1971-1972 school year.

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September 30, 1972

Dr. David Abramson
Acting Director
Bureau of Educational Research
BOARD OF EDUCATION
OF THE CITY OF NEW YORK
110 Livingston Street
Brooklyn, New York 11201

Dear Dr. Abramson:

In fulfillment of the agreement dated March 30, 1972 between the New York City Public Schools and the Center for Educational Research and Field Services, I am pleased to submit three hundred copies of the final report, An Evaluation of the Corrective Mathematics Services for Disadvantaged Pupils in Non-Public Schools.

The Bureau of Educational Research and the professional staff of the New York City Public Schools were most cooperative in providing data and facilitating the study in general. Although the objective of the team was to evaluate a project funded under Title I, this report goes beyond this goal. Explicit in this report are recommendations for modifications and improvement of the program. Consequently, this report will serve its purpose best if it is studied and discussed by all who are concerned with education in New York City -- the Board of Education, professional staff, students, parents, lay leaders, and other citizens. To this end, the study team is prepared to assist with the presentation and interpretation of its report. In addition, the study team looks forward to our continued affiliation with the New York City Public Schools.

You may be sure that New York University and its School of Education will maintain a continuing interest in the schools of New York City.

Respectfully submitted,

ARNOLD SPINNER
Director

AS:jh

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ACKNOWLEDGEMENTS

To Lawrence F. Larkin, Director of the Office of State and Federally Assisted Programs for the Non-Public Schools and Mrs. Lucille A. Stovall, Coordinator of Corrective Mathematics Services, both of the New York City Board of Education for their cooperation and their advice on goals and procedures;

To Mr. Ambrose Emilio, Rabbi Burton Jaffa, Mr. Joseph P. O'Connor and Mr. George Prassas, Title I Liaison Officers at the New York City Board of Education for their help in facilitating our evaluation by enabling us to obtain access to various schools;

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W.Z.

EXECUTIVE SUMMARY

A. The Program Description

The Corrective Mathematics Services Program for Disadvantaged Pupils in Non-public Regular Day Schools[1] was proposed to serve approximately 14,032 poverty area children who attended 165 non-public regular day schools. Those children were eligible for these services whose score on a standardized test in mathematics was more than one standard deviation below the grade norm. Corrective services were provided by licensed teachers from the New York City Board of Education as an in-school program during the regular school hours. In addition, a room deemed adequate for the needs of small group instruction was to be made available by the non-public school. Teachers were to be given in-service training and instructional material and necessary equipment were to be provided. Most children were to receive instruction in groups of approximately ten pupils.

The stated objectives of the program were as follows:

1. Pupils in grades 2 and 3 enrolled in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three months to eight months depending on age, grade, degree of retardation and other causitive factors. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics by exploring mathematical ideas independently.

2. Pupils in grades 4, 5 and 6 enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. They will be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon these factors. Moreover, they will be expected to demonstrate greater interest in, and appreciation of, mathematical ideas by increased participation in the mathematics class.

3. Pupils in grades 7, 8 and 9 enrolled in the project will be expected to increase achievement levels in computational skills and also in problem solving from six months to one year or more depending upon age, grade, degree of retardation and other causitive factors.

[1]Corrective Mathematics Services for Disadvantaged Pupils in Non-Public Schools, 1971–1972, Title I, ESEA Board of Education, City of New York

B. Evaluation Objectives

1. *Evaluation Objective 1:* To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved:

(a) *Aspects of the Evaluation:*

(1') Project and non-project students in each of a stratified random sample of 20 schools selected approximately in proportion to the distribution of the schools by religion in the entire set of 149 schools actually serviced were subjected to a rather close statistical analysis. (See parts (2') and (3') which follow.)

(2') Pre and post-test scores on the Metropolitan Achievement Tests were obtained. In order to assess the gain in achievement of the project students, a "control" group was established by taking the MAT scores of students on the waiting lists in the 18 schools in our random sample from which we were ablt to obtain the needed data in order to conduct our analyses. Pertinent confidence intervals were computed by the analysis of covariance.

(3') In an attempt to assess the extent to which the improvement of the mathematical attitude of students in the project exceeds that of students not in the project, the following design was followed:

Tests of mathematical attitude were constructed by the team of evaluators and given to the project students and to the non-project students in the schools both near the beginning of the school year and near the end of the school year. One attitude test was given to the students in grades 2 -- 6, and another was given to those in grades 7 and above. The questions were written in both English and Spanish on each test paper.

The results of these tests were used to determine the increase favorable attitude toward mathematics on the part of the project students as well as the relationship (correlation) between mathematical attitude and achievement in mathematics on the MAT's.

(b) *Findings* (The findings (a') and (b') which follow, correspond, respectively, to the preceding items (2') and (3') under part (a) which we just discussed.)

(a') In the opinion of the evaluating team the gains in achievement from the project are sufficiently greater than those from the waiting list to state with 95% confidence that the project in general, is very worthwhile. (See Chapter II, Part B.)

(b') There is very little evidence to support any claim that the project has any considerable effect upon the attitude of students toward mathematics as indicated by the tests in Appendices X and XI. (See Chapter II, Part C.)

2. *Evaluation Objective 2:* To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated program objectives.

(a) *Aspects of the Evaluation*

(1') Project students and project teachers in the random sample of 20 schools were subjected to a close analysis. (See Part (2') which follows.) In addition, principals and at least one regular classroom teacher in each of the 20 schools were interviewed during on-site visits. Ratings of eight teaching practices of the project teachers in the 20 schools were made. (See Part (3') below.) Moreover, there were pertinent questions on anonymous questionnaires to the project teachers, principals and regular classroom teachers in each of the 149 schools. (See Part (4') below.)

(2') For the project students in each of the 20 schools in our sample, a study was made of the relationship between achievement and the number of project teaching sessions attended by the students. A coefficient of partial correlation was computed to assess the relationship between achievement at the end of the year and the number of sessions a student was taught.

(3') For the project teachers in each of the 20 schools, a correlation coefficient was computed for the relationship between the mean achievement of each school and the project teacher's total rating (See Appendix I) as well as for the teacher's rating on each of the eight teaching practices.

(4') Numerical Assignments were made to the alternate responses to the pertinent questions on the anonymous questionnaires sent to all project teachers and arithmetic means were computed.

(a) *Findings* (The findings (a'), (b') and (c') which follow, correspond, respectively, to the preceding items (2'), (3') and (4') under part (a) which we just discussed.)

(a') It appears of little consequence whether a student's attendance is good or poor – he learns the same in either case. (See Chapter III, Part A.)

(b') There is not even any barely acceptable evidence of any worthwhile relation between any of the ratings (as indicated in the form given in Appendix I) and any of the three measures of achievement in mathematics – computation, concepts, and problem-solving. (See Chapter III, Part A.)

(c') In general, according to the responses to pertinent questions on the anonymous questionnaires, the procedures followed in the Corrective Mathematics Services Program were regarded as being satisfactory by the 64 (out of 96) responding project teachers. (See Chapter III, Part A.)

3. *Evaluation Objective 3:* To present recommendations for improving the effectiveness of Corrective Mathematics Services Program.

(a) *Recommendations:*

1. The pre-testing should be done in the fall despite the complaint of the non-public school supervisors. For without both a pre-test and post-test score obtained according to a consistent schedule, it is difficult to measure pupil progress validly.

2. The practice in some schools of having a corrective mathematics teacher see the same children on each of three or four days under an experimental program yielded significantly better results than those made by the children receiving two periods of remedial instruction. The practice should be extended.

3. The supervisors should extend the practice of working with, and talking to, individual children during their visits to the schools.

4. The corrective teacher should write some sort of progress report (not a grade) periodically during the year about each child in the corrective program. These reports might be sent home to parents and/or to regular teacher.

5. Since the corrective math program is of a remedial nature, it seems advisable that the corrective mathematics teacher have adequate space to handle small workshops.

6. There should be more flexibility in corrective program so that children could move in and out more easily during the academic year. (Subject to appropriate investigation.)

7. One day a week service is practically meaningless. Not only do the children involved forget almost everything from week to week, but with holidays, sickness, etc. the service, in reality, is truly tokenism.

8. Teachers need more training conferences, where they may work at the materials on an individual basis. It is not sufficient to have demonstration classes.

9. A workshop could be offered for the parents at each school. This way, the parents might be able to provide some home assistance which would reinforce the program. Perhaps the Board and an individual non-public school could share the responsibility (at least financial) of providing such a workshop.

10. Corrective mathematics teachers should reinforce topics treated in the regular classroom by teaching and developing closely related topics at appropriately correlated times.

11. There still is very little meaningful contact between the regular classroom teacher and the corrective teacher. At most, they usually only eat lunch together.

12. There should be some orientation provided for "new" regular classroom teachers so that they fully understand the purposes and procedures for the corrective mathematics program. Efforts should be made on the part of the coordinator in cooperation with the non-public school staff to this end.

13. Coordinators and supervisors can stimulate more interest in the corrective math program by giving demonstrations or by explaining the program to the regular faculty of the school.

14. Corrective mathematics teachers should be available to attend a regular school faculty conference in the early fall.

15. Corrective teachers should be given *some* idea of how to handle minor emotional problems that they might encounter. Perhaps the Title I guidance counselor in a school might conduct a workshop to assist the corrective teachers.

16. Consideration should be given (subject to appropriate investigation) to dropping disruptive discipline problems from the program.

17. There are schools where it becomes virtually automatic for some children to go to the corrective mathematics class year after year. There should be some limits set on how long a particular student, who shows no or little sign of progress, would be permitted to continue in the program.

(b) *Conclusion:*

The evaluators continue to believe that the corrective Mathematics Services Program is a successful and viable program.

I. INTRODUCTION

A. Program Description

According to the program proposal[1], corrective mathematics instruction was to be provided for approximately 14,032 disadvantaged pupils attending 165 non-public schools. The schools included in this program are located chiefly in poverty areas having high concentrations of low-income families.

Those children whose score on a standardized achievement test in mathematics is more than one standard deviation below the grade norm were deemed eligible for participation in the program. A room deemed adequate for the needs of small group instruction was to be made available by the non-public school during the regular school hours. Teachers were to be assigned to give instruction to small groups of approximately ten children. In the event that it is not possible to secure personnel for instruction during the regular school hours, services were to be provided in the same schools after regular hours until such time as regular staff becomes available. All personnel must be licensed by the Board of Education.

Inservice training of the Corrective Mathematics Teachers was to be conducted under the supervision of the Project Coordinator with the assistance of field supervisors and mathematics consultants. Workshops for the parents of the non-public school children admitted to the program were to be conducted by the field supervisors and the Corrective Mathematics Teachers.

The evaluation covers the instruction program which operated during the school year, September 1, 1971 to June 30, 1972.

The stated objectives of the program were as follows:

1) Pupils in grades 2 and 3 enrolled in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon age, grade, degree of retardation and other causative factors. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics by exploring mathematical ideas independently.

[1] Corrective mathematics Services for Disadvantaged Pupils in Non-Public Schools, 1971–1972, Title 1, ESEA Board of Education, City of New York.

2) Pupils in grades 4, 5, and 6 enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. They will be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon these factors. Moreover, they will be expected to demonstrate greater interest in, and appreciation of, mathematical ideas by increased participation in the mathematics class.

3) Pupils in grades 7, 8, and 9 enrolled in the project will be expected to increase achievement levels in computational skills and also in problem solving from six months to one year or more depending upon age, grade, degree of retardation, and other causative factors.

The central administrative staff of the program interpreted the figure of 14,032 students as including both the children who were serviced and those who were tested in the fall of 1971, but were left on the waiting list. Approximately 6,063 children were actually serviced by the corrective mathematics program during 1971-1972. These children were distributed among 148 schools of various religious demoninations. The professional staff included: the Project Coordinator, five field supervisors, and 96 teachers. The number of teachers included 27 regularly appointed teachers, 10 regularly assigned substitute teachers, and 59 per diem teachers. In the following table we indicate the distribution of days of service.

Days of Service	Number of Schools
5	22
4	7
3	24
2	47
1½	2
1	43
½	4
Total	149

The number of children who were serviced during the school year and tested in June, 1972 were distributed by grade level as follows:

Grade	Number of Children
2	272
3	1224
4	1358
5	1137
6	960
7	603
8	368
9	81
10	60
Total	6063*

B. Evaluation Objectives

1) To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved. In this connection, one of our criteria for the success of the program consists of the following items which were selected on the basis of our past experience with the project. Since our past experience indicated that the project was quite successful, we decided to select these as "minimal" criteria.

Grade	Criterion for Success
2	At least 75% have a 6 month gain or more.
3-computation	At least 60% have a 6 month gain or more.
-prob. solving	At least 60% have a 3 month gain or more.
4-computation	At least 60% have a 4 month gain or more.
-prob. solving	At least 65% have a 3 month gain or more.
5-computation	At least 65% have a 4 month gain or more.
-prob. solving	At least 60% have a 3 month gain or more.
6-computation	At least 75% have a 4 month gain or more.
-prob. solving	At least 65% have a 3 month gain or more.
7-computation	At least 75% have a 6 month gain or more.
-prob. solving	At least 60% have a 6 month gain or more.
8-computation	At least 75% have a 6 month gain or more.
-prob. solving	At least 70% have a 6 month gain or more.
9-computation	At least 90% have a 6 month gain or more.
-prob. solving	At least 90% have a 6 month gain or more.

* Does not include children in four schools who were not tested in June because of project teacher illness.

2) To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated objectives.

3) To present recommendations for improving the effectiveness of the Corrective Mathematics Services Program.

C. Aspects of the Evaluation

1) *Evaluation Objective 1:* To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved.

(a) Subjects – Project and non-project students in each of a stratified random sample of 20 schools selected approximately in proportion to the distribution of the schools by religion in the entire set of 149 schools actually serviced were subjected to a rather close analysis. (See part (b) which follows.) On the basis of our two years experience in evaluating this program, we believe that the differences in achievement between the project and non-project students would be of such a magnitude that a sample of 20 schools will provide sufficient power to our statistical analyses so that we may obtain reasonably confident conclusions.

(b) Methods and Procedures

(1') Pre and post-test scores on the MAT were obtained for the children in the 20 schools of our sample who were in the Corrective Mathematics Program. Moreover, pre and post-test scores were also obtained for the students in 18 of the 20 schools who were left on the waiting list – these latter students were the "Control Group." The children from this "Control Group" were paired by grade level with those in our sample who were in the project. The fact that the Control Group students, in general, scored higher on the pre-test was taken into account in our statistical analysis. (The results will be discussed in Chapter II.) The reason we did not obtain waiting list scores from the other two schools appears to be due only to a "misunderstanding" on the part of the project teachers in that school and not because of intentional withholding. Thus, we do not think that the results of our statistical analyses are compromised because these data are lacking.

(2') In an attempt to assess the extent to which the improvement of the attitude of students toward mathematics in the project exceeds that of students not in the project, the following design was followed:

Tests of mathematical attitude were constructed by the team of evaluators and given to the project students and to the non-projects in the schools both near the beginning of the school year and near the end of the school year. One interest test was given to the students in grades 2–6, and another was given to those in grades 7 and above. The questions were written in both English and Spanish on each test paper. The results of these tests were used to determine the improvement in mathematical attitude on the part of the project students as well as the relationship between mathematical attitude and achievement in mathematics on the MAT's. (Appendices X and XI – the tests and their correlation with MAT achievement and their results will be discussed in Chapter II).

(c) Statistical and/or Qualitative Analysis – The material under (1') and (2') in the following discussion relates, respectively, to the methods and procedures under the corresponding numbers in the preceding item (b), "Methods and Procedures."

(1') Pertinent confidence intervals were obtained from an analysis of the pre and post-test scores on the MAT of the project students and the non-project students in our random sample of 20 schools. These confidence intervals were computed in the various cases by the analysis of covariance to determine whether or not there is a difference in mathematics achievement between those who received special remedial work and those who did not.

(2') The questions on the interest test formulated by the evaluation team were submitted to a reading specialist who reworded them to make them as clear as possible to students of the ages to be tested.

We used a scale of responses for each question with the different levels of responses being *never, sometimes,* and *most of the time* for grades 2–6, and *all the time* for grades 7 and above. In scoring the tests the responses were assigned numbers in such a way that a high number always indicates higher interest than does a lower number. A particular student's score on the test was taken to be

the mean of all the scores on the individual questions that were actually answered by the students.

After the test was developed, it was administered to both project and non-project (waiting list) students in our random sample of schools. For each student, both the total test score and the score on each question was recorded. Then, for each question, a Pearson product-moment coefficient of correlation was computed for the scores on that question paired with the corresponding total scores. Thus, we had one coefficient of correlation for each question. If, for a particular question this coefficient is non-positive, or even if it is positive but very low, then that question was excluded from further analysis. New total scores were then computed for all the questions not thus excluded. This process of exclusion was repeated using these new total scores. This procedure was continued until all questions had a correlation coefficient sufficiently high to yield 95% confidence that, in general, the score on that question was positively related to the total score. (If such a test is given again in future years, some of the questions that are excluded from further analysis in the fall of 1971 may be used in reworded form.)

A coefficient of correlation was computed in order to obtain the split-half reliability coefficient. That is, half of the questions were considered to be one test and the other half another test, and the coefficient of correlation between these two tests was computed. This coefficient was then corrected by the Spearman-Brown correction formula to account for the fact that each half-test has only half as many questions as the actual test. If the resulting reliability was greater than .80, the test was considered to be sufficiently reliable. If not, the question having lowest correlation with the total score was discarded and the reliability was recomputed. This procedure was repeated until a sufficiently high reliability coefficient was obtained.

When the discarding processes were over, a total score was computed for each student for only those questions that were still included and this score will be known as the pre-test score. Thus, the one administration of the test near the beginning of the year was used both for perfecting the test and also for the actual pre-test scores.

Near the end of the year, the same attitude test was given and it included all the questions that were on the pre-test regardless of whether they were excluded or not from further analysis at the beginning of the year. We did this for the following reason: If the questions that were excluded from analysis on the pre-test, did not appear at all on the post-test, the two tests may not be equivalent since they would be of different lengths. Also, some questions, although they may not be considered in the total post-test score, may still help to establish rapport and, thus, influence the responses to other questions. A total test score was computed for each student using only those questions that were included in the pre-test score and this score as called the post-test score.

An analysis of covariance was computed using the post-test scores as the dependent variable, the type of treatment – that is, whether the student was in the project or not — as the independent variable, and the pre-test score as a covariance. This analysis yielded a confidence interval within which the confidence is 95% that the difference between the mean attitude of project students at the end of the year and the mean attitude of non-project students at the end of the year lies. Of course, adjustments were made to account for differences in attitude at the end of the year that appear to have been caused by differences in interest at the beginning of the year. By adjustments we mean that the effect of the beginning scores was removed by using the *gain* in achievement as the score.

The pre-test and post-test achievement scores from the Metropolitan Achievement Test and pre-test and post-test scores from the interest test are four scores for each project student in our random sample. A correlation coefficient for the relationship between the post-test achievement score and the post-test interest score was computed to assess the strength of the relation between attitude and achievement. Of course, the effect of the pre-test scores were removed at the beginning of the computation.

(d) *Time Schedule*

Pre-tests MAT and Attitude — September 1971

Post-tests MAT and Attitude — May and June 1972

2) *Evaluation Objective 2:* To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated program objectives.

(a) *Subjects:*

Project students and project teachers in the random sample of 20 schools were subjected to a close analysis. (See part (b) which follows.) In addition, principals and at least one regular classroom teacher in each of the 20 schools were interviewed. Moreover, there were pertinent questions on anonymous questionnaires to project teachers, principals, and regular classroom teachers in each of the 149 schools. On the basis of our two years experience in evaluating this program, we believe that the differences in achievement between the project and non-project students would be of such magnitude that a sample of 20 schools will provide sufficient power to our statistical analyses to that we may obtain reasonable confident conclusions.

(b) *Methods and Procedures:*

(1') For the project students in each of the 20 schools in our random sample, a study was made of the relationship between achievement and the number of project teaching sessions attended by the students. We obtained for each project student in our random sample a Metropolitan Achievement Test post-test score, as well as a number which is the number of sessions that the student was taught and a Metropolitan Achievement Test pre-test score.

(2') On-site visits to each of the random sample of schools were conducted. These visits were begun in the fall of 1971. In addition, four of these schools were arbitrarily selected and visited for a second time in the spring 1972.

During each visit, the corrective teacher, the principal, and two regular classroom teachers were interviewed in conformity with specially prepared interview forms. (Appendices I, II, and III.) Ratings of eight teaching practices of the project teachers in the 20 schools were made and analyses were carried out to assess the relation between achievement and these teaching practices. Among the other teaching practices we investigated are: respect of the project teacher for the students, the project teacher's expectation for the student, and the

authoritarianism of the project teacher. Pertinent data was obtained during the on-site visits by the evaluators in their observations of the corrective mathematics classes. (The results will be discussed in Chapter III.)

(3') Pertinent questions were included in each of the anonymous questionnaires which were mailed to teachers, principals, and two regular classroom teachers in all of the 149 schools. (See Appendices IV, VI, VIII, respectively. The results of our analysis of pertinent questions will be given in Chapter III. Analysis of other questions are given in Appendices V, VII, and IX.)

(c) *Statistical and/or Qualitative Analysis* – The material under (1'), (2'), and (3') in the following discussion relates, respectively, to the methods and procedures under the corresponding numbers in the proceeding item (b) "Methods and Procedures."

(1') A coefficient of partial correlation was computed for each school in our sample to assess the relation between achievement at the end of the year and the number of sessions that a student was taught. In the course of the computation the effect of the pre-test achievement was removed.

(2') A correlation coefficient was computed for the relationship between the mean achievement of the project students in each school of our sample and the project students in each school of our sample and the project teacher's total rating as well as for the teacher's rating on each of the teaching practices.

(3') Numerical assignments were made to the alternative responses to the pertinent questions on all the anonymous questionnaires and arithmetic means were computed.

Time Schedule

On-site visits – throughout school year

Mailing of anonymous questionnaires – March 1972

3) *Evaluation Objective 3:* To present recommendations for improving the effectiveness of the Corrective Mathematics Services Program. These recommendations are based on the results of our statistical analyses and interviews. (The recommendations are given in Chapter III.)

II. IMPLEMENTATION OF EVALUATION OBJECTIVE 1

For Evaluation Objective 1, the evaluation team examined the degree to which the proposed program objectives have been achieved.

A. A Gross Analysis of the Gain of the Project Students.

As we indicated in Chapter I, part B-1, one of our criteria for success of the program consists of having at least a particular percent of the students at each grade level achieve a particular gain. In the following table we give the grade level, the criterion for success, and the actual percent achieving a 6 month gain.

Grade Level	Criterion for Success	6 Month Gain
2	75% have a 6 month gain or more	84.3%
3-computation	60% have a 6 month gain or more	85.1%
-prob. solving	60% have a 3 month gain or more	70.9%
4-computation	60% have a 4 month gain or more	83.5%
-prob. solving	65% have a 3 month gain or more	67.6%
5-computation	65% have a 4 month gain or more	79.4%
-prob. solving	60% have a 3 month gain or more	67.8%
6-computation	75% have a 4 month gain or more	71.1%
-prob. solving	65% have a 3 month gain or more	63.9%
7-computation	75% have a 6 month gain or more	91.7%
-prob. solving	60% have a 6 month gain or more	87.1%
8-computation	75% have a 6 month gain or more	95.3%
-prob. solving	70% have a 6 month gain or more	87.6%
9-computation	90% have a 6 month gain or more	98.7%
-prob. solving	90% have a 6 month gain or more	100.0%

We observe from the preceding table that our criterion for success was met at the 6 month level in all grades but the sixth. In the case of the sixth grade, the divergence is quite small and an examination of the raw data indicates that it is very probable that the originally stated percent criterion is actually met for both computation and problem solving for 4 month and 3 month gains, respectively.

B. A Statistical Comparison of Achievement in Mathematics of the Project Students and the Non-Project Students.

A major portion of the analyses involved comparisons between an "experimental" group and a "control" group from which useful confidence intervals were computed.

To estimate the accomplishment of the three program objectives (See Chapter I, Part A) mathematics achievement was measured for (1) a sample of project students in twenty randomly chosen schools and (2) a comparable sample of students on the waiting list in eighteen of these schools. As was true for the students in the project, students on the waiting list were one or more standard deviations below the national mean in mathematics achievement at the beginning of the school year. However, because of limited accommodations, the students chosen for participation in the project were those most below this mean. To adjust for this slight dissimilarity, measures of mathematics achievement for both samples were obtained both at the beginning and the end of the school year, with final scores adjusted to reflect initial differences in favor of the students on the waiting list.

The Metropolitan Achievement Test (MAT) was used to measure the achievement for all students both at the beginning and the end of the school year. Three measures of achievement were obtained from the MAT: one for ability to do arithmetic computations, one for understanding of concepts, and one for ability to solve problems. From the differences between the means of these three scores for the sample of project students and the corresponding means for the sample of students on the waiting list, estimates were made by the procedure of analysis of variance of the analogous differences between the means of the overall population of project students and the overall population of waiting list students. These estimates of population differences are taken to be estimates of the differences between the method of instruction of the project students and the method of instruction of the waiting list students and are, therefore, a measure of the effectiveness of the project. Since all the differences between sample means, were in favor of the project students, an estimate was made for each overall population mean difference d, of that difference D for which there is 95% confidence that d is greater than D. These estimates were calculated for the following groups: (1) all grades – second through eighth – taken together; (2) the second grade; (3) the third and fourth grades taken together; (4) the fifth and sixth grades taken together; and (5) the seventh and eighth grades taken together. (There were no 9th grade students in the random sample. Only 81 or approximately 1-1/3% of the 6,063 children in the program were in grade 9.

The random sample was stratified by religious code and the sampling did not pick-up any 9th graders.)

Various grades were combined because we believed that the fragmentation of information would be too great for each grade separately. The evaluation team felt that there was not enough difference in content between two consecutive grades for separate analyses to be of great interest. Account was taken of variables in pupils exposure. (See Chapter 3.) The number of days that each project student attended the program was recorded and coefficients of correlation were computed for the relations between this exposure and the achievements. The exposure of non-project students was zero for each student.

The means and differences are all stated in units of one "year of achievement" which is the average achievement gained during one year by children in general in the entire country. Thus, one year of achievement gain is the average achievement gain for the nation as a whole. Since this year of achievement is considered to be a ten-month year, the number of tenths of years of achievement gain is also the number of months of gain. Thus, for example, six tenths of a year of gain means six months gain. Table 1 on the following page lists these estimates.

Since the number of degrees of freedom is rather large in all but one case, namely the concepts scores for Grades Seven and Eight, the critical t ratio was taken to be 1.65 in every case, which is the same as for a normal distribution. Although the number of subjects is certainly accounted for in the computation of the standard error, the sample of only 12 project students for the comparison of concepts for Grades Seven and Eight is very questionable.

The standard error is reported in Table I so that it is possible for the reader to compute any other confidence limits that may be desired. The lower limit of any confidence interval is, in general, the difference between the sample means and the product of the standard error and the appropriate critical t ratio, which can be found in a table in most statistics texts. For example, referring to "computation – all grades" we have (to the nearest thousandth) .298 = .384–(.052 x 1.65).

TABLE 1

Estimates Of Differences Between Achievement Gains

For Project Students And Waiting List Students

	Sample Statistics				Estimates		
	Waiting		Project				
	# of Students	Mean Gain	# of Students	Mean Gain	Standard Error of Difference	Lower Limit	Difference Between Sample Means
ALL GRADES							
Computation	741	1.107	865	1.491	.052	.298	.384
Concepts	494	.729	740	1.011	.057	.188	.282
Problem-Solving	550	.888	817	1.150	.082	.127	.262
GRADES THREE AND FOUR							
Computation	266	1.141	430	1.462	.068	.209	.321
Concepts	224	.868	428	.990	.066	.013	.122
Problem-Solving	224	.682	427	1.056	.138	.146	.374
GRADES FIVE AND SIX							
Computation	181	.551	303	1.245	.087	.550	.694
Concepts	152	.464	300	.990	.104	.354	.526
Problem-Solving	166	.459	270	.989	.096	.372	.530
GRADES SEVEN AND EIGHT							
Computation	294	1.418	132	2.153	.129	.522	.735
Concepts	118	.808	12	2.267	.417	.771	1.459
Problem-Solving	160	1.623	120	1.847	.178	−.070	.224

The lower limits of the confidence intervals in Table I reveal that, in all cases except Grades Seven and Eight in problem-solving where the lower limit is negative, there is at least 95% confidence that project students in general have greater achievement than waiting list students. For example, from the item "All Grades: Computation", there is 95% confidence that the gain in achievement of project students exceeds that of waiting list students by at least about three-tenths (actually .298) or a year, which is three months of achievement gain. It may be noted that this does not mean that the project students gained only three-tenths of a year in one year of instruction, but rather that project students in general gain three-tenths of a year more than waiting list students. Since there is less than 95% confidence that the project students in the seventh and eighth grades gain any more at all in problem-solving than waiting list students, it can not be stated with 95% confidence that the project is effective in increasing the achievement of the problem-solving ability of seventh and eighth graders. However, since the difference between the sample means is positive and is about two months (.224) there is greater probability that the project enhances the problem-solving ability of seventh and eighth graders than there is that it detracts from this ability. Since all of the other lower confidence limits are positive, there is at least 95% confidence that the project is effective for all of the other comparisons. However, since there is 95% confidence that the understanding of concepts of third and fourth graders is increased by only about one-hundredth of a year more by being in the project than be being on the waiting list, it cannot be said that there is 95% confidence that the project is effective in increasing the understanding of concepts of third and fourth graders in any really worthwhile way. Although the worth of the gain is a value judgment and cannot be decided by any statistical method, a glance at the lower confidence limits reveals that, at least in the opinion of the evaluating team, the gains from the project are indeed sufficiently greater than those from the waiting list to state with 95% confidence that the project is, in general, very worthwhile.

Another analysis was done to compare schools with one another. The analysis of variance was used and an F ratio was computed for computation alone, for concepts, and for problem-solving to find out whether it can be asserted with 95% confidence that the schools did not all come from the same population. This analysis is for all grades combined and is for project students only. The results of that analysis are shown in Tables 2A, 2B, and 2C follow below.

No confidence intervals were computed for these analyses because there are too many comparisons of pairs of schools that could be made and because the point of the analysis was not

to show which of any two schools is doing better, but only to show that in some schools the project functions more effectively than in other schools. Indeed, we see that the sample means for some schools are more than double the sample means for some other schools. In all three analyses the probability that the samples could be random samples from the same population is zero when rounded off to three decimal places. Of course, these probabilities cannot really be exactly zero because there is always some probability that the samples could have drawn from a single population. However, the probabilities are so small that, for all practical purposes, there is 100% confidence that the schools do not all produce the same achievement in their project students. It should be emphasized that only project students are involved in this particular analysis and so the differences between schools are not likely to be caused by different amounts of money spent by the host schools.

TABLE 2A
All Grades Computation

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
31	1.694	.745
40	1.357	.911
21	1.929	1.031
57	1.447	1.158
65	1.331	.897
63	1.544	1.035
99	1.902	.984
20	1.475	.761
34	1.050	.750
45	1.231	.896
40	1.262	1.087
20	1.515	.875
17	1.559	.870
79	1.215	.764
40	1.407	.693
41	1.939	1.243
37	1.122	.762
64	1.391	.991
40	1.675	.881
12	2.583	1.305

.892 = Mean Square within groups = Error Variance
117.807 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

One may only speculate why these differences between schools occur. One very likely explanation is that there is a great deal of variability among the project teachers. Another possible explanation is that there is a great variability within the backgrounds of the students before they come into the project. Some of the schools may have many more recent immigrants with serious language problems than other schools. Some of the schools may be in ghettos and others not. If the families of the students in some of the schools are very poor while others are not so impoverished, the latter ones may have greater educational opportunities in general and possible greater motivation toward learning mathematics.

TABLE 2B
All Grades Concepts

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
25	1.296	.569
31	.952	1.027
16	.687	1.110
48	.512	.821
65	1.375	.829
59	1.225	1.266
49	1.361	.780
20	1.050	.385
34	1.182	.953
45	.967	.748
30	.570	1.052
20	1.605	.719
16	.787	1.324
76	.854	.775
40	.845	.693
20	.990	.733
38	.776	.723
63	1.105	1.057
40	.825	.984
5	1.040	.635

.810 = Mean Square within groups = Error Variance
52.732 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

TABLE 2C
All Grades Problem-Solving

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
31	1.426	1.056
40	1.005	.779
21	.648	.894
59	.905	.932
65	1.103	.830
27	.637	.702
99	1.667	1.081
20	.845	.581
34	1.238	.739
45	2.091	5.590
40	.860	1.105
20	1.110	.493
16	.644	.868
79	1.038	.781
40	.900	.663
41	1.698	1.147
38	.479	.877
50	.778	.880
40	.832	.935
12	3.033	2.248

2.549 = Mean Square within groups = Error Variance
20.934 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

C. Estimates of the Improvement in Attitude Toward Mathematics and of the Relationship between Attitude and Achievement in Mathematics.

In addition to the Metropolitan Achievement Test, the students in the project and on the waiting list were given an attitude inventory both at the beginning of the year and at the end (See Appendices X and XI.) Since the evaluators were not able to find an appropriate published instrument for measuring attitude toward mathematics, an instrument consisting of 20 questions was made up by them for the purposes of this study. The validity of this instrument was taken

at face value. That is, since the questions, by their meaning, seemed to be obviously asking about attitude toward mathematics, it was assumed that it must be measuring what the evaluators choose to define as attitude toward mathematics.

To check how well the instrument was measuring whatever it was measuring, various statistics were computed. For all the grades together as well as for each grade alone, two coefficients of reliability were computed. One was the Kuder-Richardson coefficient and the other the Spearman-Brown split half coefficient both of which are described in Guilford, J. P. *Fundamental Statistics in Psychology and Education.* McGraw-Hill, New York, 1956, pp. 452-455. These reliability coefficients are listed in Table 3.

TABLE 3
Reliability Coefficients

Grade	Kuder-Richardson	Spearman-Brown	Sample Size
ALL	.67	.74	1418
TWO	.43	.48	45
THREE	.50	.66	349
FOUR	.71	.75	286
FIVE	.69	.69	196
SIX	.71	.79	225
SEVEN	.77	.79	199
EIGHT	.69	.75	145

In order to improve the internal consistency of the instrument, correlation coefficients were computed for the relation between each question of the instrument and the total score. Since some of the questions were not answered by some of the students, the mean response was taken as the total score rather than the sum of the responses. Because some of the questions were worded in such a way that a high score indicated a favorable sttitude, while other questions were worded so that a high score indicated an unfavorable attitude, the latter responses were so analyzed in the computations that, a high score consistently indicated a favorable attitude toward mathematics. For Grades Two through Six, each question was accompanied by three possible responses – disagreement, neutral, agreement – scored as 1, 2, and 3, respectively. For Grades Seven and Eight, there were five possible responses – strong disagreement,

agreement, neutral, agreement, strong agreement – scored as one through five, respectively. In order to make the responses comparable for all grades, a score of three for Grades Two through Six was changed to a score of five, a score of two was changed to a score of three, while a score of one was left unchanged. Thus, for all questions and for all grades a score of one reflects a strongly unfavorable attitude, or at least an unfavorable attitude, toward mathematics, a score of three reflects a neutral opinion, and a score of five reflects a strongly favorable attitude, or at least a favorable attitude toward mathematics. In cases in which there were responses of two and four, the meanings are between one and three and between three and five respectively.

For all grades together and for each grade separately, except Grade Two, the correlation coefficients were found to be high enough for one to be at least 99% confident that any particular question measures, to some extent, the same attributes that the whole test measures. However, for Grade Two, the correlation coefficients were low and were even negative for some questions. Considering these low correlation coefficients as well as the low reliability coefficients shown in Table 3, it appears that the instrument was not appropriate for use with second grade children. Perhaps it is not even possible to measure the attitudes of such young children for (1) their attitudes may not yet be stabilized, (2) they may not be able to express their feelings well, and (3) they may not fully understand the directions of a standardized instrument.

Because of the low correlation coefficient for Grade Two, some of the most weakly related questions were dropped from the instrument for this grade and new correlation coefficients and reliability coefficients were computed. Questions 3, 5, 7, 8, 10, 13, 17, 18, and 20 were dropped for the second grade and for purposes of computing the correlation coefficients for all grades together, the second graders were not included in the computations affecting the questions. All twenty questions were retained for the other grades. Thus, there were actually two instruments, one for the second grade, consisting of only eleven questions, and another for all the other grades consisting of twenty questions. The reliability coefficients shown in Table 3 for the Second Grade are those that were computed after the questions were dropped. The correlation coefficients and sample sizes are listed in Table 4.

The sample size may actually be different for each question as well as for each grade because not all of the questions were answered by all students. However, as the sample sizes are nearly the same for all questions for any one grade, only one size is given. The actual number of students who responded to each question was used in computing the correlation coefficients.

TABLE 4

Relations Between Each Question And The Total Score

	Grade							
	All	2	3	4	5	6	7	8
Sample Size	1418	45	349	286	196	225	199	145
Question								
1	.429	.404	.258	.398	.288	.505	.433	.461
2	.384	.255	.190	.131	.433	.445	.347	.462
3	.407		.333	.495	.315	.250	.432	.504
4	.199	.153	.088	.287	.200	.268	.286	.247
5	.338		.198	.190	.349	.417	.384	.385
6	.480	.567	.398	.370	.440	.514	.479	.565
7	.224		.241	.203	.328	.454	.335	.245
8	.314		.146	.137	.263	.193	.483	.410
9	.562	.543	.362	.589	.543	.603	.583	.589
10	.221		.333	.001	.181	.151	.263	.345
11	.197	.392	.238	.373	.341	.201	.284	.238
12	.427	.340	.377	.374	.391	.341	.447	.494
13	.380		.342	.517	.477	.553	.420	.418
14	.352	.162	.398	.244	.250	.230	.460	.421
15	.433	.392	.165	.436	.501	.398	.457	.416
16	.577	.307	.466	.522	.607	.576	.668	.669
17	.373		.315	.482	.460	.579	.480	.181
18	.243		.275	.311	.421	.512	.248	.145
19	.581	.679	.540	.588	.503	.662	.566	.671
20	.379		.156	.256	.425	.368	.518	.381

Although the correlation coefficient for the relation between question ten and the total score for the fourth grade is extremely low, that question was retained rather than rejected, for purposes of maintaining a uniform instrument throughout Grades Three to Eight.

After the instrument itself was evaluated and adjusted it was administered to a sample of about 1400 students, including both children in the project and children on the waiting list. Estimates were then made of the differences between the attitude of project students and the attitude of waiting list students, in general, for all grades together, for Grade Two alone, for Grades Three and Four, for Grades Five and Six, and for Grades Seven and Eight. For each difference, a lower confidence limit was computed so that there is 95% confidence that the difference in attitude in general is greater than that lower limit. The mean attitudes and numbers of students in the project and the waiting list group are listed in Table 5, along with the difference between the sample means, the standard error of the difference, and the lower and upper limits of the 95% confidence interval.

TABLE 5
Confidence Limits For Differences In Attitude

	Waiting		Project			95% Confidence Limits		
	# of Subjects	Mean Attitude	# of Subjects	Mean Attitude	Standard Error of Difference	Lower Limit	Difference Between Sample Mean	Upper Limit
All Grades	668	2.797	735	2.890	.029	.036	.093	.150
Grade Two	16	2.097	33	2.162	.084	−.100	.065	.230
Grades Three and Four	293	3.049	324	3.078	.039	−.047	.029	.105
Grades Five and Six	144	3.015	255	2.938	.048	−.171	−.077	.017
Grades Seven and Eight	215	2.360	123	2.491	.053	.027	.131	.235

A comparison was also made, comparing the sttitudes of only project students in twelve of the twenty schools in the sample. The mean attitude, the standard deviation, and the sample size are shown in Table 6, along with the error variance, the F ratio, and the probability that the samples are indeed, random samples from a single population.

TABLE 6
Comparison Of Attitudes In Twelve Schools
For All Grades Together

Sample Size	Sample Mean	Standard Deviation
25	2.452	.400
84	2.924	.595
44	2.903	.394
18	3.128	.435
39	3.192	.431
41	3.156	.414
43	2.653	.536
38	3.055	.451
56	2.852	.603
61	3.156	.559
48	2.755	.467
61	2.902	.462

.402 = Mean Square within groups = Error Variance

666.06 = The F Ratio

.000 = The probability that the samples could have been chosen randomly from one population.

The probability indicated in Table 6 cannot really be zero. However, it is so small that it becomes zero when rounded off to three decimal places. Although there is nearly 100% confidence that there are, in general, differences in attitude between schools, comparing the mean attitude of the school with the most unfavorable attitude, namely 2.452, with that of the most favorable, namely 3.156, the difference is not so striking that it appears to be a very significant finding. Thus, there is near certainty that there are rather small differences between attitudes in the different schools.

The estimations of the differences in attitudes shown in Table 5 show that there is 95% confidence that any differences that there might be in general between the attitudes of project students and those on the waiting list are slight. For Grades two through Six, there is not even 95% confidence that the difference is even in favor or project students. For Grades Seven and

Eight and for all the grades together, there is 95% confidence that project students in general have a more favorable attitude toward mathematics than those on the waiting list. However, the differences are so slight that in the opinion of the evaluators, they can hardly be considered important. Indeed, since the attitudes were measured on a five point scale, it is again the opinion of the evaluators that even a difference of .235 on a five point scale is not enough to be considered noteworthy. Since there is 95% confidence that all of the differences are less than .235, and since there is 95% confidence that the differences for most of the grades are a great deal less than that, there is very little evidence to support any claim that the project has any considerable effect upon the attitude of students toward mathematics.

One may only conjecture why the project has no substantial effect upon the attitudes of students toward mathematics. Furthermore, this seems to contradict a later finding (Chapter III, Part A) that there is no worthwhile relation between attendance and achievement. If it is speculated that the reason that attendance has no worthwhile effect upon achievement is that by merely participating in the project a student is motivated to learn mathematics, then it would appear that this same student's attitude toward mathematics should be appreciably more improved than that of a student on the waiting list. Since this was not the case in this study, it may be that the project students do not associate the benefits of the project with mathematics itself, that is, whereas they may derive increased security and self-concept from participation in the project, they still maintain mildly unfavorable attitudes toward the actual subject matter of mathematics. It may be noted from Table 5 that the mean attitudes are generally about 3 or somewhat less than 3, which means that the overall attitudes toward mathematics of both project students and waiting list students are either neutral or somewhat unfavorable. Apparently, the initial attitudes of project students toward mathematics are sufficiently unfavorable so that the project has little or no effect upon them, even though the comparison of achievement presented earlier shows that there is at least 95% confidence that the project does indeed improve achievement.

III. IMPLEMENTATION OF EVALUATION OBJECTIVES 2 AND 3

A. Evaluation Objective 2

As indicated in Part B of Chapter I, Evaluation Objective 2 was to examine and appraise the procedures employed to achieve the stated objectives of the Corrective Mathematics Services Program.

Another way that was used to attempt to find some reasons for differences between schools and to give some recommendations for improving the instruction was to estimate the relations between the three scores of schievement gain and the attendance in the project for all grades together and for selected grades separately. As before, Grade Two had to be omitted because of the lack of achievement scores here. The sample correlation coefficients are shown in Table 7 below.

TABLE 7

Correlation Coefficients For Relations Between Three Scores Of Achievement Gain And Attendance For All Grades And For Selected Grades

	Computation	Concepts	Problem Solving
ALL GRADES	.03	.12	−.07
GRADES THREE AND FOUR	−.07	−.09	−.06
GRADES FIVE AND SIX	.27	.27	.12
GRADES SEVEN AND EIGHT	−.26	.14	−.36

The correlation coefficients are all too low to indicate any worthwhile relations. However, the data for these correlation coefficients is probably fairly good. Student attendance can surely be measured very accurately. Therefore, there is, indeed, high confidence, not that there *is* but that there *is not* any worthwhile relation between attendance and achievement. This result seems rather strange and unexpected; that is, it appears to be of little consequence whether a student's attendance is good or poor — he learns the same in either case. However, it simply may be that students who were in the project attended classes regularly, so that very minor fluctuations in attendance would have very little effect. Furthermore,

perhaps it was the mere fact that they were in the program that made them improve in their achievement and not the actual instruction that they received. Since the teachers who were interviewed almost universally stated that the students considered it a privilege, and not a stigma, to be in the project, it may be only this salutary effect of participation that was responsible for the overall gains of the program. Although this is only a conjecture, it is a possibility that might be given some serious thought. The reader should keep in mind, however, that although the correlation coefficients do indeed show high confidence that there is no worthwhile relation between attendance and achievement, no statistical analysis can ever tell why that is so.

Another study made in connection with Evaluation Objective 2 was an analysis of the ratings of eight teaching practices of the project teachers by the evaluators (See Appendix I.) A correlation coefficient was computed for the relation between the mean achievement of the project students in each school of our sample and the project teacher's total rating as well as for the teacher's rating on each of the eight teaching practices.

We hoped to ascertain some reason for the wide differences between schools (Tables 2A, 2B, and 2C.) Each project teacher in eighteen of the schools was rated on selected criteria by evaluators from New York University; correlation coefficients were then computed to estimate the relations between these ratings and the achievement of the students. There were eight criterion ratings at the start, with the mean of the eight ratings taken to be a ninth rating. The relations between these nine ratings and the three achievement scores thus yielded twenty-seven correlation coefficients, which are listed in Table 8.

TABLE 8

Correlation Coefficients For The Relations Between Three Scores Of Achievement Gain And Nine Variables Of Teacher Evaluation For Project Students Only And For All Grades Combined

	Computation	Concepts	Problem-Solving
Respect for Students	−.07	.32	.05
Teacher Expectation	.14	.37	.31
Authoritarianism	.03	.36	.22
Math Knowledge	−.00	.49	.29
Interest Students	−.04	.47	.10
Stimulate Questions	−.02	.44	.22
Individual Differences	.04	.21	.19
Open-Ended Questions	−.05	.56	−.03
Composite of Above	−.00	.46	.19

Although there were different numbers of students for the three achievement scores, there were approximately eight hundred students in all the grades together. Since the standard error of a correlation coefficient is $1/\sqrt{n-3}$, the standard error in this case is approximately $1/\sqrt{800} = .05$ and 1.65 times this standard error is about .08. Although Fisher's z' transformation is needed to normalize the distribution of correlation coefficients, even a casual observation of .08 less than each of the sample correlation coefficients above gives a rough approximation of the lower limit above which there is 95% confidence that the population correlation coefficient lies. And it can be seen thus even at a glance that the sample correlation coefficients in Table 8 are so low that they do not give even barely acceptable evidence of any worthwhile relation between any of the ratings and any of the three measures of achievement. In fact, taking .08 more than each of the above correlation coefficients, it can be seen that, in most cases, there is 95% confidence that there is not a worthwhile relation. Consider the highest correlation coefficient in Table 8, namely the correlation coefficient of .56 between the teacher's ability to ask open-ended questions and the student's performance on concepts. Since .56 + .08 = .64 which indicates what, in the opinion of some readers, may be considered to be a rather worthwhile relation, it cannot be concluded with 95% confidence that there is no worthwhile relation between the teacher rating of ability to ask open-ended questions and the students' achievement in the understanding of concepts. However, since .56 – .08 = .48 which is not very high either, there is also not 95% confidence that there is any very worthwhile relation whatever between that rating and understanding of concepts.

Since it seems absurd tc conclude that there really is no worthwhile relation between the teacher's competence and the achievement of the students, one might speculate why these ratings failed to be even slightly related to achievement. A cursory glance at the rating scores revealed that one of the raters had very much higher ratings than the other raters. The teachers were rated by three members of the evaluating team. Although the raters tried to standardize their ratings, it appears that this standardization was not accomplished. Thus the rating was more a measure of the generosity of the rater than a measure of the ability of the teacher. Furthermore, the particular characteristics of the teachers that the evaluators attempted to rate might not have been very pertinent. The characteristics were chosen to be, at face value, those teacher traits that could reasonably be expected to be related to student achievement. Perhaps the wrong criteria were chosen.

One of the procedures employed in the program involved assigning of teachers in accordance with school needs. Certainly, the existence of a sizable waiting list in almost all of the schools indicates that an expansion of the program would be required in order to carry out this procedure satisfactorily. Moreover, the fact that 49 schools, or about one-third of the 149 schools in the program, received less than two days of service (See Chapter I, Part A) also indicates that an expansion of the program would be required in order to carry out this procedure successfully. We say this because we feel that each school should be serviced at least two full days a week since the occurrence of many school holidays makes this amount of service quite necessary in most cases. We draw attention to questions 6 and 7 on the Questionnaire to Project Teachers (Appendices IV and V) in this connection. Question 6 reads: "How many time a week do you meet each student in your program?" The mean response was 2.3 times (66 respondents). Question 7 reads: "Do you feel that the number of times given in Question 6 should be – decreased, left the same, or increased?" Weights of 1, 2, and 3 were assigned to the preceding responses, respectively. The mean response was 2.6. (64 respondents). Thus, these project teachers tended to think that the number of days of service for each student should be increased.

Another procedure employed in the program involved providing teachers with in-service training. We draw attention to the questions 12 through 19 in the Questionnaire to Project Teachers since they relate to the training experiences that have been offered to the project teachers. We also draw attention to questions 36 and 39 on the Questionnaire to Project Teachers. Question 36 reads: "How would you rate the training experiences you have received since entering the program in diagnosing the remediating pupils' learning difficulties in mathematics? (Check one): Very Helpful, Helpful, Little Help, and No Help." Weights of 1, 2, 3, and 4 were assigned to these responses, respectively with the mean response 2.4. (52 respondents). Question 39 reads: "How would you rate the training you have received in the use of appropriate instructional materials? (Check one): Very Helpful, Helpful, Little Help, and No Help." Assigning weights as in Question 39 we found the mean response to be 2.0. (63 respondents).

Another procedure employed in the program involved providing instructional materials and necessary equipment. We draw attention to the responses of the project teachers to Question 27 in the Questionnaire to Project Teachers. This question reads: "How useful do you find the materials which are provided for your classroom? (Check one): Very Useful, Somewhat Useful, Useless, Hinders Learning." Weights of 1, 2, 3, and 4 were assigned to these responses,

respectively. The mean responses of the project teachers was 1.16. (64 respondents). This signifies that in the opinion of these teachers the materials provided were rather useful.

A room deemed adequate for the needs of small group instruction was to be made available by the non-public school. In order to ascertain the degree to which this procedure was carried out, the evaluators appealed to Question 29 in the Questionnaire to Project Teachers. This question reads as follows: "How would you rate the room facilities provided for your corrective class? (Check one): Satisfactory, Unsatisfactory." Weights of 1 and 2 were assigned to the responses "Satisfactory," and "Unsatisfactory," respectively. The mean response was 1.2. (65 respondents). Thus, in the opinion of these teachers the room was a little less than satisfactory.

One of the procedures employed in the program was to give instruction to groups of approximately ten pupils. In this connection we draw attention to Questions 1 and 2 on the Questionnaire to Project Teachers. Question 1 asks the teacher for the total number of pupils in the corrective mathematics classes and Question 2 asks him for the total number of corrective classes he teaches. The total of the answers to Question 1 by the 64 project teachers was 3891 pupils. (65 respondents). The mean response to Question 2 was 7.3 classes per week. (65 respondents). From these data we find that "on the average" each corrective mathematics class had 8.3 pupils.

B. Evaluation Objective 3 (Recommendations)

1. The pre-testing must be done in the fall despite the complaint of the non-public school supervisors. For without both a pre-test and a post-test score obtained according to a consistent schedule, it is difficult to measure pupil progress validly.

2. The practice in some schools of having a corrective mathematics teacher see the same children on each of three or four days under an experimental program yielded significantly better results than those made by the children receiving two periods of remedial instruction. The practice should be extended.

3. The supervisors should extend the practice of working with, and talking to, individual children during their visits to the schools.

4. The corrective teacher should write some sort of progress report (not a grade) periodically during the year about each child in the corrective program. These reports might be sent home to parents and/or to the regular teacher.

5. Since the corrective math program is of a remedial nature, it seems advisable that the corrective mathematics teachers have adequate space to handle small workshops.

6. There should be more flexibility in corrective programs so that children could come in and out more easily during the academic year. (Subject to appropriate investigation.)

7. One-day-a-week service is practically meaningless. Not only do the children involved forget almost everything from week to week, but with holidays, sickness, etc. the service, in reality, is truly tokenism.

8. Teachers need more training conferences, where they may work at the materials on an individual basis. It is not sufficient to have demonstration classes.

9. A workshop could be offered for the parents at each school. This way, the parents might be able to provide some home assistance which would reinforce the program. Perhaps the Board and an individual non-public school could share the responsibility (at least financially) of providing such a workshop.

10. Corrective mathematics teacher should reinforce topics treated in the regular classroom by teaching and developing closely related topics at appropriately correlated times.

11. There still is very little meaningful contact between the regular classroom teacher and the corrective teacher. At most, they usually only eat lunch together.

12. There should be some orientation provided for "new" regular classroom teachers so that they fully understand the purposes and procedures for the corrective mathematics program. Efforts should be made on the part of the coordinator in cooperation with the non-public school staff to this end.

13. Coordinators and supervisors can stimulate more interesting in the corrective math program by giving demonstrations or by explaining the program to the regular faculty of the school.

14. Corrective mathematics teachers should be available to attend a regular school faculty conference in the early fall.

15. Corrective teachers should be given *some* idea of how to handle minor emotional problems that they might encounter. Perhaps the Title I guidance counselor in a school might conduct a workshop to assist the corrective teachers.

16. Consideration should be given (subject to appropriate investigation) to dropping disruptive discipline problems from the program.

17. There are schools where it becomes virtually automatic for some children to go to the corrective mathematics class year after year. There should be some limits set on how long a particular student, who shows no or little sign of progress, would be permitted to continue in the program.

APPENDICES

APPENDIX I
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH PROJECT TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Teacher's Name _____ Observer _____

1. Total Number of Pupils in Corrective Classes _____
2. Total Number of Corrective Classes taught _____
3. Total Number of Pupils on Waiting List _____
4. Lowest grade level you teach _____
5. Highest grade level you teach _____
6. Educational background of project teacher:

College(s)	Degree(s)	Date(s)	Major(s)

7. List collegiate courses in mathematics and mathematics pedagogy which you have taken within the last five years.

_____

_____

8. Which of the courses listed in question 7 do you think have been the most helpful to you in your work in the corrective mathematics program? (List no more than five).

_____

_____

9. Teaching experience of project teacher:

Grade(s)	Subject(s) taught	No. of Years

10. Additional comments that might bear upon this evaluation.

_____

_____

_____

APPENDIX I – (Continued)
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
RATING SHEET FOR CLASSROOM PERFORMANCE AND
GENERAL ACADEMIC ATMOSPHERE
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

Name of School _____

Observer _____ Date _____

1.		Low = 1	2	3	4	5	6	7 = High
1.	Respect of the project teacher for the students	—	—	—	—	—	—	—
2.	The project teacher's expectation of the students' academic achievement	—	—	—	—	—	—	—
3.	Authoritarianism of the project teacher	—	—	—	—	—	—	—
4.	Project teacher's knowledge of subject matter	—	—	—	—	—	—	—
5.	Project teacher's ability to interest her(his) students	—	—	—	—	—	—	—
6.	Project teacher's ability to stimulate student questions and/or group discussion	—	—	—	—	—	—	—
7.	Project teacher's ability to provide for individual differences among students	—	—	—	—	—	—	—
8.	Project teacher's ability to ask open-ended questions	—	—	—	—	—	—	—

APPENDIX II
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH PRINCIPALS
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Principal's Name _____ Observer _____

1. What is the approximate enrollment of your school?

2. In what ways do you believe that coordinators and supervisors can be most effective in helping the project teacher to conduct the math program in your school?

3. How profitable do you feel this program is for your school?

4. Additional comments that might bear upon this evaluation.

APPENDIX iII
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH REGULAR CLASSROOM TEACHERS
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Teacher's Name _____ Observer _____

1. Number of your pupils in Corrective Math Program _____

2. Grade Level _____

3. To what extent do your students miss regular academic work in order to attend the corrective mathematics class?

_____

_____

_____

4. What kind of contact have you with the project teacher? Please state the frequency. In what ways would increased and/or different kinds of contact be more beneficial?

_____

_____

_____

_____

5. What reactions do you get from parents when they are told about their child's participation in the corrective mathematics program? How are parents informed of their child's progress over the year?

_____

_____

_____

_____

6. Additional comments that might bear upon this evaluation.

_____

_____

_____

APPENDIX IV
TITLE I CORRECTIVE PROGRAM IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO PROJECT TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. Total number of pupils in your corrective math classes _____
2. Total number of corrective classes taught _____
3. Total number of pupils on waiting list _____
4. Lowest grade level you teach _____
5. Highest grade level you teach _____
6. How many times a week do you meet each student in your program? _____
7. Do you feel that the number of times given in question 6 should be:

   Decreased _____ Left the same _____ Increased _____
8. For how many years, including the present as one full year, have you taught in the corrective math program? _____
9. Give the total number of years you have taught in elementary or junior high school. Include the present year as one full year. _____
10. Check the degrees you hold:

    Baccalaureate _____ Masters _____ Doctorate _____
11. Please list any courses you are currently taking:

    _____

    _____

    _____

How would you rate the training experiences you have received since entering the program? (Refer to questions 12-17).

	Number Attended	Very Helpful	Helpful	Little or No Help	Harmful
12. Pre-training orientation meetings	_____	_____	_____	_____	_____
13. Weekly in-service sessions with supervisors	_____	_____	_____	_____	_____

	Number Attended	Very Helpful	Helpful	Little or No Help	Harmful
14. Sessions on job with supervisors					
15. Meetings at Board with coordinator					
16. Observations you make of other teachers in program					
17. Observations of you by supervisor and subsequent discussion with supervisor					

Which two of the foregoing experiences have you found to be the most valuable? Please list in order of value. (Refer to the number of the question.)

18. (First) _____

19. (Second) _____

20. What specific recommendations, if any, do you wish to make for the improvement of the pre-training orientation meetings at the New York City Board of Education at the beginning of the current academic year? If you did not attend any of these meetings, please check here ☐ and go on to the next question.

_____

_____

_____

21. If you usually attend weekly in-service sessions, please make specific recommendations for their improvement, if any. If you do not usually attend them, please check here ☐ and go on to the next question.

_____

_____

22. If you usually attend the large group meetings at the board office, please make specific recommendations for their improvement, if any. If you do not usually attend them, please check here ☐ and go on to the next question.

_____

_____

23. Suppose you were asked to design a one-semester course which would be required of corrective mathematics teachers at your grade level. List some of the topics, both mathematics and non-mathematical, which you would include.

_____

_____

_____

24. How often do you teach material that is closely related to that being currently taught in regular class? (Check One)

Often _____ Occassionally _____ Rarely _____

25. Please indicate the change that you have noticed in the pupils' attitude towards mathematics. (Check One)

Worse _____ Little or no change _____ Improved _____

26. Give your estimate of general parents' reaction to the corrective mathematics. (Check One)

Enthusiastic _____ Apparently pleased _____ Hostile _____

Noncommital _____ Dissatisfied _____

27. How useful do you find the materials which are provided for your classroom? (Check One)

Very useful _____ Somewhat useful _____ Useless _____

Hinders learning _____

28. Please give any suggestions you have for additional materials.

_____

_____

_____

29. How would you rate the room facilities provided for your corrective class? (Check One)

Satisfactory _____ Unsatisfactory _____

30. Please suggest how your contacts with supervisors can be made more helpful.

_____

_____

_____

31. Approximately what number of children are on a "waiting list" to enter your corrective class?

    Specify number_____

32. How successful do you believe you have been as a corrective teacher? (Check One)

    Very successful _____ Somewhat successful _____ Unsuccessful _____

33. What do you consider to be the major reason for any lack of success you may have experienced?

    _____

    _____

    _____

34. Do the students seem to think that attending the corrective mathematics program is a stigma, a privilege, or do they seem to be neutral? (Check One)

    Stigma _____ Neutral _____ Privilege _____

35. If your answer is "stigma" please suggest how this negative attitude might be improved.

    _____

    _____

    _____

36. How would you rate the training experiences you have received since entering the program in diagnosing the remediating pupils' learning difficulties in mathematics? (Check One)

    Very Helpful _____ Helpful _____ Little Help _____ No Help_____

37. Please state specifically those aspects of the training you received in diagnosing and remediating pupils' learning difficulties in mathematics that were the most helpful.

    _____

    _____

    _____

38. Please make specific suggestions for the improvement of the training you received in diagnosing and remediating learning difficulties in mathematics.

    _____

    _____

    _____

39. How would you rate the training you have received in the use of appropriate instructional materials?

Very Helpful _____ Helpful_____ Little Help _____ No Help _____

40. To what extent do you think you have succeeded in adapting your teaching techniques to meet the specific needs of disadvantaged children?

Great _____ Some _____ Practically zero _____ Zero _____

41. As a professional educator, please give a general evaluation of the corrective mathematics program.

_____

_____

_____

_____

_____

42. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

_____

_____

_____

_____

_____

APPENDIX V
DISCUSSION OF QUESTIONNAIRE TO PROJECT TEACHERS

We now present an analysis of the responses to certain questions on the Questionnaire for Project Teachers. In particular, we shall not analyze questions which call for suggestions on the part of the project teachers because many of the suggestions which appeared on the approximately 64 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: 3,891 pupils

Question 2: Mean response was 7.3 classes per week

Question 3: 4,276 pupils

Question 6: Mean response was 2.3 times per week

Question 7: We assigned weights of 1, 2, and 3 to the responses – Decreased, Left the same, and Increased, respectively. The mean response was 2.6.

Question 8: The mean response was 3.8 years

Question 9: The mean response was 6.7 years

Question 10: We assigned weights of 1, 2, and 3 to the responses – Baccalaureate, Masters, and Doctorate, respectively. The mean response was 1.5.

Question 12-19: We list the six training experiences given in these questions and alongside of each we give the mean number attended. Moreover, we assigned weights of 1, 2, and 3, respectively, to the responses: Very Helpful, Helpful, Little or no help, and Harmful, respectively. Beside the mean number of training experiences attended we give the mean response to the question by those who answered.

	Training Experience	Mean Number Attended	Mean Rating
12.	Pre-training orientation meetings	5.0	1.3
13.	Weekly in-service sessions with supervisors	2.3	1.6

	Training Experience	Mean Number Attended	Mean Rating
14.	Sessions on job with supervisors	8.4	1.3
15.	Meetings at Board with coordinator	8.8	1.6
16.	Observations you make of other teachers in program	.6	1.4
17.	Observations of you by supervisors and subsequent discussion with supervisor	7.6	1.7

Questions 18 and 19: The respondents gave the following overall ranking (from most valuable to least) to these six training experiences: 15, 17, 14, 12, 16, and 13.

Question 24: Assigning the weights 1, 2, and 3 to the responses Often, Occasionally, and Rarely, respectively, we found that the mean response was 1.8.

Question 25: Assigning the weights 1, 2, and 3 to Worse, Little or no change, and Improved we found that the mean response was 2.8.

Question 26: Assigning the weights 1, 2, 3, 4, and 5 to the responses Enthusiastic, Apparently pleased, Non-committal, Dissatisfied, and Hostile, respectively, the mean response was 2.0.

Question 27: Assigning the weights 1, 2, 3, and 4 to Very useful, Somewhat useful, Useful, and Hinders learning, respectively, the mean response was 1.0.

Question 29: Assigning the weights 1 and 2 to the responses Satisfactory and Unsatisfactory, respectively, the mean response was 1.2.

Question 31: The mean response was 83 pupils.

Question 32: Assigning the weights 1, 2, and 3 to Very successful, Somewhat successful, and Unsuccessful, respectively, the mean response was 2.4.

Question 34: Assigning the weights 1, 2, and 3 to the responses Stigma, Neutral, and Privilege, respectively, the mean response was 1.6.

Question 36: Assigning the weights 1, 2, 3, and 4 to the responses Very helpful, Helpful, Little help, and No help, respectively, the mean response was 2.4.

Question 39: Assigning weights as in Question 36, the mean response was 2.0.

Question 40: Assigning the weights 1, 2, 3, and 4 to Great, Some, Practically zero, and Zero, respectively, the mean response was 1.7.

APPENDIX VI
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO PRINCIPAL
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. What percent of those students who qualify for admission to the corrective mathematics program are accommodated?

   _____ %

2. Give your estimate of regular staff members' reactions to the corrective mathematics program. (Please Check One)

   Enthusiastic _____ Apparently pleased _____

   Noncommital _____ Dissatisfied _____

3. Please add any suggestions you may have for improving staff reaction:

   _____

   _____

   _____

   _____

4. As a professional educator, please give a general evaluation of the corrective mathematics program.

   _____

   _____

   _____

   _____

5. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

   _____

   _____

   _____

   _____

APPENDIX VII
DISCUSSION OF QUESTIONNAIRE TO PRINCIPALS

We now present an analysis of the responses to certain questions on the Questionnaire for Principals. We shall not analyze questions which call for suggestions on the part of the principals because many of the suggestions which appeared on the approximately 84 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: The mean response was 38.3%.

Question 2: Assigning the weights 1, 2, 3, and 4 to Enthusiastic, Apparently pleased, Non-committal, and Dissatisfied, respectively, the mean response was 2.2.

APPENDIX VIII
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO REGULAR CLASSROOM TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. Number of pupils in corrective mathematics program. _____

2. Grade Level that you teach _____ .

In general, how has participation in the corrective mathematics program changed students' *attitudes* toward the items referred to in questions 3 through 8? Next to each of these questions encircle the appropriate number according to the following code:

(1) Strengthened very much
(2) Strengthened somewhat
(3) Practically no change
(4) Weakened somewhat
(5) Weakened very much

3.	Mathematics:	(1)	(2)	(3)	(4)	(5)
4.	School, in general:	(1)	(2)	(3)	(4)	(5)
5.	Studying:	(1)	(2)	(3)	(4)	(5)
6.	Attendance:	(1)	(2)	(3)	(4)	(5)
7.	Volunteering in classroom:	(1)	(2)	(3)	(4)	(5)
8.	Himself:	(1)	(2)	(3)	(4)	(5)

9. Do the students seem to think that attending the corrective mathematics program is a stigma or a privilege or do they seem to be neutral? Please check one.

Stigma _____ Neutral _____ Privilege _____

10. If your answer to question 9 is "stigma", please suggest how this attitude might be improved.

_____

_____

11. To what extent, if any, do the children miss the *Subject matter* of their regular mathematics class in order to attend the corrective mathematics class? (Check One)

Great _____ Some _____

Practically Zero _____ Zero _____

In general, if students lose time in any regular class to attend corrective mathematics classes, does this create problems: (Refer to questions 12 through 17).

12. For the student? (Check One)

Yes _____ No _____

13. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

14. For the class? (Check One)

Yes _____ No _____

15. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

16. For you? (Check One)

Yes _____ No _____

17. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

18. Is there sufficient contact between you and the project teacher for the teacher to be kept abreast of what is being taught in the regular classroom? (Check One)

Yes _____ No _____

19. Whose responsibility do you think it is to see that the project teacher is so informed?

_____

_____

_____

20. Are you kept abreast of what is being taught in the corrective class? (Check One)

Yes _____ No _____

21. Whose responsibility do you think it is to see that you are so informed?

_____

_____

_____

22. To what extent do you think that the corrective mathematics program has assisted the participating students in developing a sense of responsibility for their own learning activities: (Check One)

Great _____ Some _____

Practically Zero _____ Zero _____

23. As a professional educator, please give a general evaluation of the corrective mathematics program.

_____

_____

_____

_____

_____

24. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

_____

_____

_____

_____

_____

APPENDIX IX
DISCUSSION OF QUESTIONNAIRE TO REGULAR CLASSROOM TEACHERS

We now present an analysis of the responses to certain questions on the question for Regular Classroom Teachers. We shall not analyze questions which call for suggestions on the part of the regular classroom teachers because many of the suggestions which appeared on the approximately 147 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: The mean response was 12.0 pupils.

Question 3: The mean response was 2.0 pupils.

Question 4: The mean response was 2.4 pupils.

Question 5: The mean response was 2.5 pupils.

Question 6: The mean response was 2.5 pupils.

Question 7: The mean response was 2.1 pupils.

Question 9: Assigning weights of 1, 2, and 3 to Stigma, Neutral, and Privilege, respectively, the mean response was 2.2.

Question 11: Assigning weights of 0, 1, 2, and 3 to Zero, Practically Zero, Some, and Zero, respectively, the mean response was 1.7.

Question 12: 43% answered Yes and 57% answered No.

Question 14: 23% answered Yes and 77% answered No.

Question 16: 39% answered Yes and 61% answered No.

Question 18: 71% answered Yes and 29% answered No.

Question 20: 63% answered Yes and 37% answered No.

Question 21: 47% said the project teacher, 37% said both teachers, 13% said the regular teacher. There were a few other scattered responses (approximately 3%).

Question 22: Assigning weights of 0, 1, 2, and 3 to Zero, Practically Zero, Some, and Great, respectively, the mean response was 2.6.

APPENDIX X
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
CORRECTIVE MATHEMATICS PROGRAM

ARITHMETIC INVENTORY – GRADES 2 – 6

School _____ Date _____

Name _____ Class _____

A. I like to wake up early in the morning.

1	2	3
never	sometimes	most of the time

B. I like to do arithmetic for fun.

1	2	3
never	sometimes	most of the time

1. I like doing arithmetic better than reading a story.

1	2	3
never	sometimes	most of the time

2. I think doing arithmetic is easy.

1	2	3
never	sometimes	most of the time

3. At home, I like to do my arithmetic homework first.

1	2	3
never	sometimes	most of the time

4. Looking at a lot of numbers scares me.

1	2	3
never	sometimes	most of the time

5. I think arithmetic is more like a game than like schoolwork.

1	2	3
never	sometimes	most of the time

6. I think about arithmetic when I have nothing else to do.

1	2	3
never	sometimes	most of the time

7. I give up fast when I cannot answer an arithmetic problem.

1	2	3
never	sometimes	most of the time

8. I like to do story problems.

1	2	3
never	sometimes	most of the time

9. I think working with numbers is fun.

1	2	3
never	sometimes	most of the time

10. I try very hard to understand arithmetic.

1	2	3
never	sometimes	most of the time

11. I get mixed up when I do arithmetic problems.

1	2	3
never	sometimes	most of the time

12. I do arithmetic puzzles just for fun.

1	2	3
never	sometimes	most of the time

13. When I have to do arithmetic in school I feel bad.

1	2	3
never	sometimes	most of the time

14. I like to count things.

1	2	3
never	sometimes	most of the time

15. I read books that tell about numbers.

1	2	3
never	sometimes	most of the time

16. I like to do all kinds of number problems.

1	2	3
never	sometimes	most of the time

17. Doing arithmetic makes me unhappy.

1	2	3
never	sometimes	most of the time

18. I think doing arithmetic is hard.

1	2	3
never	sometimes	most of the time

19. Doing arithmetic homework is fun.

1	2	3
never	sometimes	most of the time

20. I like to use numbers when I'm not in school.

1	2	3
never	sometimes	most of the time

APPENDIX XI
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
CORRECTIVE MATHEMATICS PROGRAM

ARITHMETIC INVENTORY – GRADES 7 AND ABOVE

School _____ Date _____

Name _____ Class _____

A. I like to wake up early in the morning.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

B. I like to do mathematics for fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

1. I like doing mathematics better than reading a story.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

2. I think doing mathematics is easy.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

3. At home, I like to do my mathematics homework first.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

4. Looking at a lot of numbers scares me.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

5. I think mathematics is more like a game than like schoolwork.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

6. I think about mathematics when I have nothing else to do.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

7. I give up fast when I cannot answer a mathematics problem.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

8. I like to do story problems.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

9. I think working with numbers is fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

10. I try very hard to understand mathematics.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

11. I get mixed up when I do mathematics problems.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

12. I do mathematics puzzles just for fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

13. When I have to do mathematics in school I feel bad.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

14. I like to count things.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

15. I read books that tell about numbers.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

16. I like to do all kinds of number problems

1	2	3	4	5
never	sometimes	half the time	very often	all the time

17. Doing mathematics makes me unhappy.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

18. I think doing mathematics is hard.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

19. Doing mathematics homework is fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

20. I like to use numbers when I'm not in school.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

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ABSTRACT

The Corrective Mathematics Services Program for Disadvantaged Pupils in Nonpublic Regular Day Schools, funded under Title I of the 1965 Elementary Secondary Education Act, was proposed to serve approximately 14,032 poverty area children who attended 165 non-public regular day schools. Those children were eligible for these services whose score on a standardized test in mathematics was more than one standard deviation below the grade norm. Corrective services were provided by licensed teachers from the New York City Board of Education as an in-school program during the regular school hours. In addition, a room was made available by the non-public school. Teachers were to be given in-service training and instructional material and necessary equipment were to be provided. Most children were to receive instruction in groups of approximately ten pupils. Two stated objectives of the program were as follows: (1) Pupils in grades two and three in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three to eight months ceteris paribus. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics. (2) Pupils in grades four, five and six enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. (Author/JM)

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AN EVALUATION OF THE CORRECTIVE MATHEMATICS SERVICES FOR DISADVANTAGED PUPILS IN NON-PUBLIC SCHOOLS

ESEA TITLE I PROGRAM

Evaluation of a New York City school district educational project funded under Title I of the Elementary and Secondary Education Act of 1965 (PL 89-10), performed under contract with the Board of Education of the City of New York for the 1971-1972 school year.

Project Evaluation Team:
William Zlot, Director
Edward Carroll
Than Porter
Stanley Taback

CENTER FOR EDUCATIONAL RESEARCH AND FIELD SERVICES
School of Education
New York University

August, 1972

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September 30, 1972

Dr. David Abramson
Acting Director
Bureau of Educational Research
BOARD OF EDUCATION
OF THE CITY OF NEW YORK
110 Livingston Street
Brooklyn, New York 11201

Dear Dr. Abramson:

In fulfillment of the agreement dated March 30, 1972 between the New York City Public Schools and the Center for Educational Research and Field Services, I am pleased to submit three hundred copies of the final report, An Evaluation of the Corrective Mathematics Services for Disadvantaged Pupils in Non-Public Schools.

The Bureau of Educational Research and the professional staff of the New York City Public Schools were most cooperative in providing data and facilitating the study in general. Although the objective of the team was to evaluate a project funded under Title I, this report goes beyond this goal. Explicit in this report are recommendations for modifications and improvement of the program. Consequently, this report will serve its purpose best if it is studied and discussed by all who are concerned with education in New York City -- the Board of Education, professional staff, students, parents, lay leaders, and other citizens. To this end, the study team is prepared to assist with the presentation and interpretation of its report. In addition, the study team looks forward to our continued affiliation with the New York City Public Schools.

You may be sure that New York University and its School of Education will maintain a continuing interest in the schools of New York City.

Respectfully submitted,

ARNOLD SPINNER
Director

AS:jh

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APPENDICES

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ACKNOWLEDGEMENTS

To Lawrence F. Larkin, Director of the Office of State and Federally Assisted Programs for the Non-Public Schools and Mrs. Lucille A. Stovall, Coordinator of Corrective Mathematics Services, both of the New York City Board of Education for their cooperation and their advice on goals and procedures;

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W.Z.

EXECUTIVE SUMMARY

A. The Program Description

The Corrective Mathematics Services Program for Disadvantaged Pupils in Non-public Regular Day Schools[1] was proposed to serve approximately 14,032 poverty area children who attended 165 non-public regular day schools. Those children were eligible for these services whose score on a standardized test in mathematics was more than one standard deviation below the grade norm. Corrective services were provided by licensed teachers from the New York City Board of Education as an in-school program during the regular school hours. In addition, a room deemed adequate for the needs of small group instruction was to be made available by the non-public school. Teachers were to be given in-service training and instructional material and necessary equipment were to be provided. Most children were to receive instruction in groups of approximately ten pupils.

The stated objectives of the program were as follows:

1. Pupils in grades 2 and 3 enrolled in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three months to eight months depending on age, grade, degree of retardation and other causitive factors. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics by exploring mathematical ideas independently.

2. Pupils in grades 4, 5 and 6 enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. They will be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon these factors. Moreover, they will be expected to demonstrate greater interest in, and appreciation of, mathematical ideas by increased participation in the mathematics class.

3. Pupils in grades 7, 8 and 9 enrolled in the project will be expected to increase achievement levels in computational skills and also in problem solving from six months to one year or more depending upon age, grade, degree of retardation and other causitive factors.

[1] Corrective Mathematics Services for Disadvantaged Pupils in Non-Public Schools, 1971–1972, Title I, ESEA Board of Education, City of New York

B. Evaluation Objectives

1. *Evaluation Objective 1:* To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved:

(a) *Aspects of the Evaluation:*

(1') Project and non-project students in each of a stratified random sample of 20 schools selected approximately in proportion to the distribution of the schools by religion in the entire set of 149 schools actually serviced were subjected to a rather close statistical analysis. (See parts (2') and (3') which follow.)

(2') Pre and post-test scores on the Metropolitan Achievement Tests were obtained. In order to assess the gain in achievement of the project students, a "control" group was established by taking the MAT scores of students on the waiting lists in the 18 schools in our random sample from which we were ablt to obtain the needed data in order to conduct our analyses. Pertinent confidence intervals were computed by the analysis of covariance.

(3') In an attempt to assess the extent to which the improvement of the mathematical attitude of students in the project exceeds that of students not in the project, the following design was followed:

Tests of mathematical attitude were constructed by the team of evaluators and given to the project students and to the non-project students in the schools both near the beginning of the school year and near the end of the school year. One attitude test was given to the students in grades 2 -- 6, and another was given to those in grades 7 and above. The questions were written in both English and Spanish on each test paper.

The results of these tests were used to determine the increase favorable attitude toward mathematics on the part of the project students as well as the relationship (correlation) between mathematical attitude and achievement in mathematics on the MAT's.

(b) *Findings* (The findings (a') and (b') which follow, correspond, respectively, to the preceding items (2') and (3') under part (a) which we just discussed.)

(a') In the opinion of the evaluating team the gains in achievement from the project are sufficiently greater than those from the waiting list to state with 95% confidence that the project in general, is very worthwhile. (See Chapter II, Part B.)

(b') There is very little evidence to support any claim that the project has any considerable effect upon the attitude of students toward mathematics as indicated by the tests in Appendices X and XI. (See Chapter II, Part C.)

2. *Evaluation Objective 2:* To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated program objectives.

(a) *Aspects of the Evaluation*

(1') Project students and project teachers in the random sample of 20 schools were subjected to a close analysis. (See Part (2') which follows.) In addition, principals and at least one regular classroom teacher in each of the 20 schools were interviewed during on-site visits. Ratings of eight teaching practices of the project teachers in the 20 schools were made. (See Part (3') below.) Moreover, there were pertinent questions on anonymous questionnaires to the project teachers, principals and regular classroom teachers in each of the 149 schools. (See Part (4') below.)

(2') For the project students in each of the 20 schools in our sample, a study was made of the relationship between achievement and the number of project teaching sessions attended by the students. A coefficient of partial correlation was computed to assess the relationship between achievement at the end of the year and the number of sessions a student was taught.

(3') For the project teachers in each of the 20 schools, a correlation coefficient was computed for the relationship between the mean achievement of each school and the project teacher's total rating (See Appendix I) as well as for the teacher's rating on each of the eight teaching practices.

(4') Numerical Assignments were made to the alternate responses to the pertinent questions on the anonymous questionnaires sent to all project teachers and arithmetic means were computed.

(a) *Findings* (The findings (a'), (b') and (c') which follow, correspond, respectively, to the preceding items (2'), (3') and (4') under part (a) which we just discussed.)

(a') It appears of little consequence whether a student's attendance is good or poor -- he learns the same in either case. (See Chapter III, Part A.)

(b') There is not even any barely acceptable evidence of any worthwhile relation between any of the ratings (as indicated in the form given in Appendix I) and any of the three measures of achievement in mathematics - computation, concepts, and problem-solving. (See Chapter III, Part A.)

(c') In general, according to the responses to pertinent questions on the anonymous questionnaires, the procedures followed in the Corrective Mathematics Services Program were regarded as being satisfactory by the 64 (out of 96) responding project teachers. (See Chapter III, Part A.)

3. *Evaluation Objective 3:* To present recommendations for improving the effectiveness of Corrective Mathematics Services Program.

(a) *Recommendations:*

1. The pre-testing should be done in the fall despite the complaint of the non-public school supervisors. For without both a pre-test and post-test score obtained according to a consistent schedule, it is difficult to measure pupil progress validly.

2. The practice in some schools of having a corrective mathematics teacher see the same children on each of three or four days under an experimental program yielded significantly better results than those made by the children receiving two periods of remedial instruction. The practice should be extended.

3. The supervisors should extend the practice of working with, and talking to, individual children during their visits to the schools.

4. The corrective teacher should write some sort of progress report (not a grade) periodically during the year about each child in the corrective program. These reports might be sent home to parents and/or to regular teacher.

5. Since the corrective math program is of a remedial nature, it seems advisable that the corrective mathematics teacher have adequate space to handle small workshops.

6. There should be more flexibility in corrective program so that children could move in and out more easily during the academic year. (Subject to appropriate investigation.)

7. One day a week service is practically meaningless. Not only do the children involved forget almost everything from week to week, but with holidays, sickness, etc. the service, in reality, is truly tokenism.

8. Teachers need more training conferences, where they may work at the materials on an individual basis. It is not sufficient to have demonstration classes.

9. A workshop could be offered for the parents at each school. This way, the parents might be able to provide some home assistance which would reinforce the program. Perhaps the Board and an individual non-public school could share the responsibility (at least financial) of providing such a workshop.

10. Corrective mathematics teachers should reinforce topics treated in the regular classroom by teaching and developing closely related topics at appropriately correlated times.

11. There still is very little meaningful contact between the regular classroom teacher and the corrective teacher. At most, they usually only eat lunch together.

12. There should be some orientation provided for "new" regular classroom teachers so that they fully understand the purposes and procedures for the corrective mathematics program. Efforts should be made on the part of the coordinator in cooperation with the non-public school staff to this end.

13. Coordinators and supervisors can stimulate more interest in the corrective math program by giving demonstrations or by explaining the program to the regular faculty of the school.

14. Corrective mathematics teachers should be available to attend a regular school faculty conference in the early fall.

15. Corrective teachers should be given *some* idea of how to handle minor emotional problems that they might encounter. Perhaps the Title I guidance counselor in a school might conduct a workshop to assist the corrective teachers.

16. Consideration should be given (subject to appropriate investigation) to dropping disruptive discipline problems from the program.

17. There are schools where it becomes virtually automatic for some children to go to the corrective mathematics class year after year. There should be some limits set on how long a particular student, who shows no or little sign of progress, would be permitted to continue in the program.

(b) *Conclusion:*

The evaluators continue to believe that the corrective Mathematics Services Program is a successful and viable program.

I. INTRODUCTION

A. Program Description

According to the program proposal[1], corrective mathematics instruction was to be provided for approximately 14,032 disadvantaged pupils attending 165 non-public schools. The schools included in this program are locate.' chiefly in poverty areas having high concentrations of low-income families.

Those children whose score on a standardized achievement test in mathematics is more than one standard deviation below the grade norm were deemed eligible for participation in the program. A room deemed adequate for the needs of small group instruction was to be made available by the non-public school during the regular school hours. Teachers were to be assigned to give instruction to small groups of approximately ten children. In the event that it is not possible to secure personnel for instruction during the regular school hours, services were to be provided in the same schools after regular hours until such time as regular staff becomes available. All personnel must be licensed by the Board of Education.

Inservice training of the Corrective Mathematics Teachers was to be conducted under the supervision of the Project Coordinator with the assistance of field supervisors and mathematics consultants. Workshops for the parents of the non-public school children admitted to the program were to be conducted by the field supervisors and the Corrective Mathematics Teachers.

The evaluation covers the instruction program which operated during the school year, Septen ber 1, 1971 to June 30, 1972.

The stated objectives of the program were as follows:

1) Pupils in grades 2 and 3 enrolled in the project will be expected to increase achievement levels in computational skills from six months to one year depending upon age, grade, degree of retardation and other causative factors. They will also be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon age, grade, degree of retardation and other causative factors. Moreover, these children will be expected to demonstrate increased interest and curiosity in mathematics by exploring mathematical ideas independently.

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[1] Corrective mathematics Services for Disadvantaged Pupils in Non-Public Schools, 1971–1972, Title I, ESEA Board of Education, City of New York.

2) Pupils in grades 4, 5, and 6 enrolled in the project will be expected to develop greater skill in translating verbal problems into mathematical equations and in finding solutions. They will be expected to increase achievement levels in verbal problem solving from three months to eight months depending upon these factors. Moreover, they will be expected to demonstrate greater interest in, and appreciation of, mathematical ideas by increased participation in the mathematics class.

3) Pupils in grades 7, 8, and 9 enrolled in the project will be expected to increase achievement levels in computational skills and also in problem solving from six months to one year or more depending upon age, grade, degree of retardation, and other causative factors.

The central administrative staff of the program interpreted the figure of 14,032 students as including both the children who were serviced and those who were tested in the fall of 1971, but were left on the waiting list. Approximately 6,063 children were actually serviced by the corrective mathematics program during 1971-1972. These children were distributed among 148 schools of various religious demoninations. The professional staff included: the Project Co-ordinator, five field supervisors, and 96 teachers. The number of teachers included 27 regularly appointed teachers, 10 regularly assigned substitute teachers, and 59 per diem teachers. In the following table we indicate the distribution of days of service.

Days of Service	Number of Schools
5	22
4	7
3	24
2	47
1½	2
1	43
½	4
Total	149

The number of children who were serviced during the school year and tested in June, 1972 were distributed by grade level as follows:

Grade	Number of Children
2	272
3	1224
4	1358
5	1137
6	960
7	603
8	368
9	81
10	60
Total	6063*

B. Evaluation Objectives

1) To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved. In this connection, one of our criteria for the success of the program consists of the following items which were selected on the basis of our past experience with the project. Since our past experience indicated that the project was quite successful, we decided to select these as "minimal" criteria.

Grade	Criterion for Success
2	At least 75% have a 6 month gain or more.
3-computation	At least 60% have a 6 month gain or more.
-prob. solving	At least 60% have a 3 month gain or more.
4-computation	At least 60% have a 4 month gain or more.
-prob. solving	At least 65% have a 3 month gain or more.
5-computation	At least 65% have a 4 month gain or more.
-prob. solving	At least 60% have a 3 month gain or more.
6-computation	At least 75% have a 4 month gain or more.
-prob. solving	At least 65% have a 3 month gain or more.
7-computation	At least 75% have a 6 month gain or more.
-prob. solving	At least 60% have a 6 month gain or more.
8-computation	At least 75% have a 6 month gain or more.
-prob. solving	At least 70% have a 6 month gain or more.
9-computation	At least 90% have a 6 month gain or more.
-prob. solving	At least 90% have a 6 month gain or more.

* Does not include children in four schools who were not tested in June because of project teacher illness.

2) To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated objectives.

3) To present recommendations for improving the effectiveness of the Corrective Mathematics Services Program.

C. Aspects of the Evaluation

1) *Evaluation Objective 1:* To examine the degree to which the proposed objectives of the Corrective Mathematics Services Program have been achieved.

(a) Subjects -- Project and non-project students in each of a stratified random sample of 20 schools selected approximately in proportion to the distribution of the schools by religion in the entire set of 149 schools actually serviced were subjected to a rather close analysis. (See part (b) which follows.) On the basis of our two years experience in evaluating this program, we believe that the differences in achievement between the project and non-project students would be of such a magnitude that a sample of 20 schools will provide sufficient power to our statistical analyses so that we may obtain reasonably confident conclusions.

(b) Methods and Procedures

(1') Pre and post-test scores on the MAT were obtained for the children in the 20 schools of our sample who were in the Corrective Mathematics Program. Moreover, pre and post-test scores were also obtained for the students in 18 of the 20 schools who were left on the waiting list – these latter students were the "Control Group." The children from this "Control Group" were paired by grade level with those in our sample who were in the project. The fact that the Control Group students, in general, scored higher on the pre-test was taken into account in our statistical analysis. (The results will be discussed in Chapter II.) The reason we did not obtain waiting list scores from the other two schools appears to be due only to a "misunderstanding" on the part of the project teachers in that school and not because of intentional withholding. Thus, we do not think that the results of our statistical analyses are compromised because these data are lacking.

(2') In an attempt to assess the extent to which the improvement of the attitude of students toward mathematics in the project exceeds that of students not in the project, the following design was followed:

Tests of mathematical attitude were constructed by the team of evaluators and given to the project students and to the non-projects in the schools both near the beginning of the school year and near the end of the school year. One interest test was given to the students in grades 2–6, and another was given to those in grades 7 and above. The questions were written in both English and Spanish on each test paper. The results of these tests were used to determine the improvement in mathematical attitude on the part of the project students as well as the relationship between mathematical attitude and achievement in mathematics on the MAT's. (Appendices X and XI – the tests and their correlation with MAT achievement and their results will be discussed in Chapter II).

(c) Statistical and/or Qualitative Analysis – The material under (1') and (2') in the following discussion relates, respectively, to the methods and procedures under the corresponding numbers in the preceding item (b), "Methods and Procedures."

(1') Pertinent confidence intervals were obtained from an analysis of the pre and post-test scores on the MAT of the project students and the non-project students in our random sample of 20 schools. These confidence intervals were computed in the various cases by the analysis of covariance to determine whether or not there is a difference in mathematics achievement between those who received special remedial work and those who did not.

(2') The questions on the interest test formulated by the evaluation team were submitted to a reading specialist who reworded them to make them as clear as possible to students of the ages to be tested.

We used a scale of responses for each question with the different levels of responses being *never*, *sometimes*, and *most of the time* for grades 2–6, and *all the time* for grades 7 and above. In scoring the tests the responses were assigned numbers in such a way that a high number always indicates higher interest than does a lower number. A particular student's score on the test was taken to be

the mean of all the scores on the individual questions that were actually answered by the students.

After the test was developed, it was administered to both project and non-project (waiting list) students in our random sample of schools. For each student, both the total test score and the score on each question was recorded. Then, for each question, a Pearson product-moment coefficient of correlation was computed for the scores on that question paired with the corresponding total scores. Thus, we had one coefficient of correlation for each question. If, for a particular question this coefficient is non-positive, or even if it is positive but very low, then that question was excluded from further analysis. New total scores were then computed for all the questions not thus excluded. This process of exclusion was repeated using these new total scores. This procedure was continued until all questions had a correlation coefficient sufficiently high to yield 95% confidence that, in general, the score on that question was positively related to the total score. (If such a test is given again in future years, some of the questions that are excluded from further analysis in the fall of 1971 may be used in reworded form.)

A coefficient of correlation was computed in order to obtain the split-half reliability coefficient. That is, half of the questions were considered to be one test and the other half another test, and the coefficient of correlation between these two tests was computed. This coefficient was then corrected by the Spearman-Brown correction formula to account for the fact that each half-test has only half as many questions as the actual test. If the resulting reliability was greater than .80, the test was considered to be sufficiently reliable. If not, the question having lowest correlation with the total score was discarded and the reliability was recomputed. This procedure was repeated until a sufficiently high reliability coefficient was obtained.

When the discarding processes were over, a total score was computed for each student for only those questions that were still included and this score will be known as the pre-test score. Thus, the one administration of the test near the beginning of the year was used both for perfecting the test and also for the actual pre-test scores.

Near the end of the year, the same attitude test was given and it included all the questions that were on the pre-test regardless of whether they were excluded or not from further analysis at the beginning of the year. We did this for the following reason: If the questions that were excluded from analysis on the pre-test, did not appear at all on the post-test, the two tests may not be equivalent since they would be of different lengths. Also, some questions, although they may not be considered in the total post-test score, may still help to establish rapport and, thus, influence the responses to other questions. A total test score was computed for each student using only those questions that were included in the pre-test score and this score as called the post-test score.

An analysis of covariance was computed using the post-test scores as the dependent variable, the type of treatment – that is, whether the student was in the project or not – as the independent variable, and the pre-test score as a covariance. This analysis yielded a confidence interval within which the confidence is 95% that the difference between the mean attitude of project students at the end of the year and the mean attitude of non-project students at the end of the year lies. Of course, adjustments were made to account for differences in attitude at the end of the year that appear to have been caused by differences in interest at the beginning of the year. By adjustments we mean that the effect of the beginning scores was removed by using the *gain* in achievement as the score.

The pre-test and post-test achievement scores from the Metropolitan Achievement Test and pre-test and post-test scores from the interest test are four scores for each project student in our random sample. A correlation coefficient for the relationship between the post-test achievement score and the post-test interest score was computed to assess the strength of the relation between attitude and achievement. Of course, the effect of the pre-test scores were removed at the beginning of the computation.

(d) *Time Schedule*

Pre-tests MAT and Attitude – September 1971

Post-tests MAT and Attitude – May and June 1972

2) *Evaluation Objective 2:* To examine and appraise the procedures employed in the Corrective Mathematics Services Program to achieve the stated program objectives.

(a) *Subjects:*

Project students and project teachers in the random sample of 20 schools were subjected to a close analysis. (See part (b) which follows.) In addition, principals and at least one regular classroom teacher in each of the 20 schools were interviewed. Moreover, there were pertinent questions on anonymous questionnaires to project teachers, principals, and regular classroom teachers in each of the 149 schools. On the basis of our two years experience in evaluating this program, we believe that the differences in achievement between the project and non-project students would be of such magnitude that a sample of 20 schools will provide sufficient power to our statistical analyses to that we may obtain reasonable confident conclusions.

(b) *Methods and Procedures:*

(1') For the project students in each of the 20 schools in our random sample, a study was made of the relationship between achievement and the number of project teaching sessions attended by the students. We obtained for each project student in our random sample a Metropolitan Achievement Test post-test score, as well as a number which is the number of sessions that the student was taught and a Metropolitan Achievement Test pre-test score.

(2') On-site visits to each of the random sample of schools were conducted. These visits were begun in the fall of 1971. In addition, four of these schools were arbitrarily selected and visited for a second time in the spring 1972.

During each visit, the corrective teacher, the principal, and two regular classroom teachers were interviewed in conformity with specially prepared interview forms. (Appendices I, II, and III.) Ratings of eight teaching practices of the project teachers in the 20 schools were made and analyses were carried out to assess the relation between achievement and these teaching practices. Among the other teaching practices we investigated are: respect of the project teacher for the students, the project teacher's expectation for the student, and the

authoritarianism of the project teacher. Pertinent data was obtained during the on-site visits by the evaluators in their observations of the corrective mathematics classes. (The results will be discussed in Chapter III.)

(3') Pertinent questions were included in each of the anonymous questionnaires which were mailed to teachers, principals, and two regular classroom teachers in all of the 149 schools. (See Appendices IV, VI, VIII, respectively. The results of our analysis of pertinent questions will be given in Chapter III. Analysis of other questions are given in Appendices V, VII, and IX.)

(c) *Statistical and/or Qualitative Analysis* – The material under (1'), (2'), and (3') in the following discussion relates, respectively, to the methods and procedures under the corresponding numbers in the proceeding item (b) "Methods and Procedures."

(1') A coefficient of partial correlation was computed for each school in our sample to assess the relation between achievement at the end of the year and the number of sessions that a student was taught. In the course of the computation the effect of the pre-test achievement was removed.

(2') A correlation coefficient was computed for the relationship between the mean achievement of the project students in each school of our sample and the project students in each school of our sample and the project teacher's total rating as well as for the teacher's rating on each of the teaching practices.

(3') Numerical assignments were made to the alternative responses to the pertinent questions on all the anonymous questionnaires and arithmetic means were computed.

Time Schedule

On-site visits – throughout school year

Mailing of anonymous questionnaires – March 1972

3) *Evaluation Objective 3:* To present recommendations for improving the effectiveness of the Corrective Mathematics Services Program. These recommendations are based on the results of our statistical analyses and interviews. (The recommendations are given in Chapter III.)

II. IMPLEMENTATION OF EVALUATION OBJECTIVE 1

For Evaluation Objective 1, the evaluation team examined the degree to which the proposed program objectives have been achieved.

A. A Gross Analysis of the Gain of the Project Students.

As we indicated in Chapter I, part B-1, one of our criteria for success of the program consists of having at least a particular percent of the students at each grade level achieve a particular gain. In the following table we give the grade level, the criterion for success, and the actual percent achieving a 6 month gain.

Grade Level	Criterion for Success	6 Month Gain
2	75% have a 6 month gain or more	84.3%
3-computation	60% have a 6 month gain or more	85.1%
-prob. solving	60% have a 3 month gain or more	70.9%
4-computation	60% have a 4 month gain or more	83.5%
-prob. solving	65% have a 3 month gain or more	67.6%
5-computation	65% have a 4 month gain or more	79.4%
-prob. solving	60% have a 3 month gain or more	67.8%
6-computation	75% have a 4 month gain or more	71.1%
-prob. solving	65% have a 3 month gain or more	63.9%
7-computation	75% have a 6 month gain or more	91.7%
-prob. solving	60% have a 6 month gain or more	87.1%
8-computation	75% have a 6 month gain or more	95.3%
-prob. solving	70% have a 6 month gain or more	87.6%
9-computation	90% have a 6 month gain or more	98.7%
-prob. solving	90% have a 6 month gain or more	100.0%

We observe from the preceding table that our criterion for success was met at the 6 month level in all grades but the sixth. In the case of the sixth grade, the divergence is quite small and an examination of the raw data indicates that it is very probable that the originally stated percent criterion is actually met for both computation and problem solving for 4 month and 3 month gains, respectively.

B. A Statistical Comparison of Achievement in Mathematics of the Project Students and the Non-Project Students.

A major portion of the analyses involved comparisons between an "experimental" group and a "control" group from which useful confidence intervals were computed.

To estimate the accomplishment of the three program objectives (See Chapter I, Part A) mathematics achievement was measured for (1) a sample of project students in twenty randomly chosen schools and (2) a comparable sample of students on the waiting list in eighteen of these schools. As was true for the students in the project, students on the waiting list were one or more standard deviations below the national mean in mathematics achievement at the beginning of the school year. However, because of limited accommodations, the students chosen for participation in the project were those most below this mean. To adjust for this slight dissimilarity, measures of mathematics achievement for both samples were obtained both at the beginning and the end of the school year, with final scores adjusted to reflect initial differences in favor of the students on the waiting list.

The Metropolitan Achievement Test (MAT) was used to measure the achievement for all students both at the beginning and the end of the school year. Three measures of achievement were obtained from the MAT: one for ability to do arithmetic computations, one for understanding of concepts, and one for ability to solve problems. From the differences between the means of these three scores for the sample of project students and the corresponding means for the sample of students on the waiting list, estimates were made by the procedure of analysis of variance of the analogous differences between the means of the overall population of project students and the overall population of waiting list students. These estimates of population differences are taken to be estimates of the differences between the method of instruction of the project students and the method of instruction of the waiting list students and are, therefore, a measure of the effectiveness of the project. Since all the differences between sample means, were in favor of the project students, an estimate was made for each overall population mean difference d, of that difference D for which there is 95% confidence that d is greater than D. These estimates were calculated for the following groups: (1) all grades – second through eighth – taken together; (2) the second grade; (3) the third and fourth grades taken together; (4) the fifth and sixth grades taken together; and (5) the seventh and eighth grades taken together. (There were no 9th grade students in the random sample. Only 81 or approximately 1-1/3% of the 6,063 children in the program were in grade 9.

The random sample was stratified by religious code and the sampling did not pick-up any 9th graders.)

Various grades were combined because we believed that the fragmentation of information would be too great for each grade separately. The evaluation team felt that there was not enough difference in content between two consecutive grades for separate analyses to be of great interest. Account was taken of variables in pupils exposure. (See Chapter 3.) The number of days that each project student attended the program was recorded and coefficients of correlation were computed for the relations between this exposure and the achievements. The exposure of non-project students was zero for each student.

The means and differences are all stated in units of one "year of achievement" which is the average achievement gained during one year by children in general in the entire country. Thus, one year of achievement gain is the average achievement gain for the nation as a whole. Since this year of achievement is considered to be a ten-month year, the number of tenths of years of achievement gain is also the number of months of gain. Thus, for example, six tenths of a year of gain means six months gain. Table 1 on the following page lists these estimates.

Since the number of degrees of freedom is rather large in all but one case, namely the concepts scores for Grades Seven and Eight, the critical t ratio was taken to be 1.65 in every case, which is the same as for a normal distribution. Although the number of subjects is certainly accounted for in the computation of the standard error, the sample of only 12 project students for the comparison of concepts for Grades Seven and Eight is very questionable.

The standard error is reported in Table I so that it is possible for the reader to compute any other confidence limits that may be desired. The lower limit of any confidence interval is, in general, the difference between the sample means and the product of the standard error and the appropriate critical t ratio, which can be found in a table in most statistics texts. For example, referring to "computation – all grades" we have (to the nearest thousandth) .298 = .384–(.052 x 1.65).

TABLE 1

Estimates Of Differences Between Achievement Gains For Project Students And Waiting List Students

	Sample Statistics				Estimates		
	Waiting		Project				
	# of Students	Mean Gain	# of Students	Mean Gain	Standard Error of Difference	Lower Limit	Difference Between Sample Means
ALL GRADES							
Computation	741	1.107	865	1.491	.052	.298	.384
Concepts	494	.729	740	1.011	.057	.188	.282
Problem-Solving	550	.888	817	1.150	.082	.127	.262
GRADES THREE AND FOUR							
Computation	266	1.141	430	1.462	.068	.209	.321
Concepts	224	.868	428	.990	.066	.013	.122
Problem-Solving	224	.682	427	1.056	.138	.146	.374
GRADES FIVE AND SIX							
Computation	181	.551	303	1.245	.087	.550	.694
Concepts	152	.464	300	.990	.104	.354	.526
Problem-Solving	166	.459	270	.989	.096	.372	.530
GRADES SEVEN AND EIGHT							
Computation	294	1.418	132	2.153	.129	.522	.735
Concepts	118	.808	12	2.267	.417	.771	1.459
Problem-Solving	160	1.623	120	1.847	.178	−.070	.224

The lower limits of the confidence intervals in Table I reveal that, in all cases except Grades Seven and Eight in problem-solving where the lower limit is negative, there is at least 95% confidence that project students in general have greater achievement than waiting list students. For example, from the item "All Grades: Computation", there is 95% confidence that the gain in achievement of project students exceeds that of waiting list students by at least about three-tenths (actually .298) or a year, which is three months of achievement gain. It may be noted that this does not mean that the project students gained only three-tenths of a year in one year of instruction, but rather that project students in general gain three-tenths of a year more than waiting list students. Since there is less than 95% confidence that the project students in the seventh and eighth grades gain any more at all in problem-solving than waiting list students, it can not be stated with 95% confidence that the project is effective in increasing the achievement of the problem-solving ability of seventh and eighth graders. However, since the difference between the sample means is positive and is about two months (.224) there is greater probability that the project enhances the problem-solving ability of seventh and eighth graders than there is that it detracts from this ability. Since all of the other lower confidence limits are positive, there is at least 95% confidence that the project is effective for all of the other comparisons. However, since there is 95% confidence that the understanding of concepts of third and fourth graders is increased by only about one-hundredth of a year more by being in the project than be being on the waiting list, it cannot be said that there is 95% confidence that the project is effective in increasing the understanding of concepts of third and fourth graders in any really worthwhile way. Although the worth of the gain is a value judgment and cannot be decided by any statistical method, a glance at the lower confidence limits reveals that, at least in the opinion of the evaluating team, the gains from the project are indeed sufficiently greater than those from the waiting list to state with 95% confidence that the project is, in general, very worthwhile.

Another analysis was done to compare schools with one another. The analysis of variance was used and an F ratio was computed for computation alone, for concepts, and for problem-solving to find out whether it can be asserted with 95% confidence that the schools did not all come from the same population. This analysis is for all grades combined and is for project students only. The results of that analysis are shown in Tables 2A, 2B, and 2C follow below.

No confidence intervals were computed for these analyses because there are too many comparisons of pairs of schools that could be made and because the point of the analysis was not

to show which of any two schools is doing better, but only to show that in some schools the project functions more effectively than in other schools. Indeed, we see that the sample means for some schools are more than double the sample means for some other schools. In all three analyses the probability that the samples could be random samples from the same population is zero when rounded off to three decimal places. Of course, these probabilities cannot really be exactly zero because there is always some probability that the samples could have drawn from a single population. However, the probabilities are so small that, for all practical purposes, there is 100% confidence that the schools do not all produce the same achievement in their project students. It should be emphasized that only project students are involved in this particular analysis and so the differences between schools are not likely to be caused by different amounts of money spent by the host schools.

TABLE 2A
All Grades Computation

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
31	1.694	.745
40	1.357	.911
21	1.929	1.031
57	1.447	1.158
65	1.331	.897
63	1.544	1.035
99	1.902	.984
20	1.475	.761
34	1.050	.750
45	1.231	.896
40	1.262	1.087
20	1.515	.875
17	1.559	.870
79	1.215	.764
40	1.407	.693
41	1.939	1.243
37	1.122	.762
64	1.391	.991
40	1.675	.881
12	2.583	1.305

.892 = Mean Square within groups = Error Variance
117.807 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

One may only speculate why these differences between schools occur. One very likely explanation is that there is a great deal of variability among the project teachers. Another possible explanation is that there is a great variability within the backgrounds of the students before they come into the project. Some of the schools may have many more recent immigrants with serious language problems than other schools. Some of the schools may be in ghettos and others not. If the families of the students in some of the schools are very poor while others are not so impoverished, the latter ones may have greater educational opportunities in general and possible greater motivation toward learning mathematics.

TABLE 2B
All Grades Concepts

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
25	1.296	.569
31	.952	1.027
16	.687	1.110
48	.512	.821
65	1.375	.829
59	1.225	1.266
49	1.361	.780
20	1.050	.385
34	1.182	.953
45	.967	.748
30	.570	1.052
20	1.605	.719
16	.787	1.324
76	.854	.775
40	.845	.693
20	.990	.733
38	.776	.723
63	1.105	1.057
40	.825	.984
5	1.040	.635

.810 = Mean Square within groups = Error Variance
52.732 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

TABLE 2C
All Grades Problem-Solving

Sample Size	Sample Mean of Gains in Grade Equivalents	Standard Deviation
31	1.426	1.056
40	1.005	.779
21	.648	.894
59	.905	.932
65	1.103	.830
27	.637	.702
99	1.667	1.081
20	.845	.581
34	1.238	.739
45	2.091	5.590
40	.860	1.105
20	1.110	.493
16	.644	.868
79	1.038	.781
40	.900	.663
41	1.698	1.147
38	.479	.877
50	.778	.880
40	.832	.935
12	3.033	2.248

2.549 = Mean Square within groups = Error Variance
20.934 = The F Ratio
.000 = The probability that the samples could have been chosen randomly from one population.

C. Estimates of the Improvement in Attitude Toward Mathematics and of the Relationship between Attitude and Achievement in Mathematics.

In addition to the Metropolitan Achievement Test, the students in the project and on the waiting list were given an attitude inventory both at the beginning of the year and at the end (See Appendices X and XI.) Since the evaluators were not able to find an appropriate published instrument for measuring attitude toward mathematics, an instrument consisting of 20 questions was made up by them for the purposes of this study. The validity of this instrument was taken

at face value. That is, since the questions, by their meaning, seemed to be obviously asking about attitude toward mathematics, it was assumed that it must be measuring what the evaluators choose to define as attitude toward mathematics.

To check how well the instrument was measuring whatever it was measuring, various statistics were computed. For all the grades together as well as for each grade alone, two coefficients of reliability were computed. One was the Kuder-Richardson coefficient and the other the Spearman-Brown split half coefficient both of which are described in Guilford, J. P. *Fundamental Statistics in Psychology and Education.* McGraw-Hill, New York, 1956, pp. 452-455. These reliability coefficients are listed in Table 3.

TABLE 3
Reliability Coefficients

Grade	Kuder-Richardson	Spearman-Brown	Sample Size
ALL	.67	.74	1418
TWO	.43	.48	45
THREE	.50	.66	349
FOUR	.71	.75	286
FIVE	.69	.69	196
SIX	.71	.79	225
SEVEN	.77	.79	199
EIGHT	.69	.75	145

In order to improve the internal consistency of the instrument, correlation coefficients were computed for the relation between each question of the instrument and the total score. Since some of the questions were not answered by some of the students, the mean response was taken as the total score rather than the sum of the responses. Because some of the questions were worded in such a way that a high score indicated a favorable sttitude, while other questions were worded so that a high score indicated an unfavorable attitude, the latter responses were so analyzed in the computations that, a high score consistently indicated a favorable attitude toward mathematics. For Grades Two through Six, each question was accompanied by three possible responses – disagreement, neutral, agreement – scored as 1, 2, and 3, respectively. For Grades Seven and Eight, there were five possible responses – strong disagreement,

agreement, neutral, agreement, strong agreement – scored as one through five, respectively. In order to make the responses comparable for all grades, a score of three for Grades Two through Six was changed to a score of five, a score of two was changed to a score of three, while a score of one was left unchanged. Thus, for all questions and for all grades a score of one reflects a strongly unfavorable attitude, or at least an unfavorable attitude, toward mathematics, a score of three reflects a neutral opinion, and a score of five reflects a strongly favorable attitude, or at least a favorable attitude toward mathematics. In cases in which there were responses of two and four, the meanings are between one and three and between three and five respectively.

For all grades together and for each grade separately, except Grade Two, the correlation coefficients were found to be high enough for one to be at least 99% confident that any particular question measures, to some extent, the same attributes that the whole test measures. However, for Grade Two, the correlation coefficients were low and were even negative for some questions. Considering these low correlation coefficients as well as the low reliability coefficients shown in Table 3, it appears that the instrument was not appropriate for use with second grade children. Perhaps it is not even possible to measure the attitudes of such young children for (1) their attitudes may not yet be stabilized, (2) they may not be able to express their feelings well, and (3) they may not fully understand the directions of a standardized instrument.

Because of the low correlation coefficient for Grade Two, some of the most weakly related questions were dropped from the instrument for this grade and new correlation coefficients and reliability coefficients were computed. Questions 3, 5, 7, 8, 10, 13, 17, 18, and 20 were dropped for the second grade and for purposes of computing the correlation coefficients for all grades together, the second graders were not included in the computations affecting the questions. All twenty questions were retained for the other grades. Thus, there were actually two instruments, one for the second grade, consisting of only eleven questions, and another for all the other grades consisting of twenty questions. The reliability coefficients shown in Table 3 for the Second Grade are those that were computed after the questions were dropped. The correlation coefficients and sample sizes are listed in Table 4.

The sample size may actually be different for each question as well as for each grade because not all of the questions were answered by all students. However, as the sample sizes are nearly the same for all questions for any one grade, only one size is given. The actual number of students who responded to each question was used in computing the correlation coefficients.

TABLE 4
Relations Between Each Question And The Total Score

	Grade							
	All	2	3	4	5	6	7	8
Sample Size	1418	45	349	286	196	225	199	145
Question								
1	.429	.404	.258	.398	.288	.505	.483	.461
2	.384	.255	.190	.131	.433	.445	.347	.462
3	.407		.333	.495	.315	.250	.432	.504
4	.199	.153	.088	.287	.200	.268	.286	.247
5	.338		.198	.190	.349	.417	.384	.385
6	.480	.567	.398	.370	.440	.514	.479	.565
7	.224		.241	.203	.328	.454	.335	.245
8	.314		.146	.137	.263	.193	.483	.410
9	.562	.543	.362	.589	.543	.603	.583	.589
10	.221		.333	.001	.181	.151	.263	.345
11	.197	.392	.238	.373	.341	.201	.284	.238
12	.427	.340	.377	.374	.391	.341	.447	.494
13	.380		.342	.517	.477	.553	.420	.418
14	.352	.162	.398	.244	.250	.230	.460	.421
15	.433	.392	.165	.436	.501	.398	.457	.416
16	.577	.307	.466	.522	.607	.576	.668	.669
17	.373		.315	.482	.460	.579	.480	.181
18	.243		.275	.311	.421	.512	.248	.145
19	.581	.679	.540	.588	.503	.662	.566	.671
20	.379		.156	.256	.425	.368	.518	.381

Although the correlation coefficient for the relation between question ten and the total score for the fourth grade is extremely low, that question was retained rather than rejected, for purposes of maintaining a uniform instrument throughout Grades Three to Eight.

After the instrument itself was evaluated and adjusted it was administered to a sample of about 1400 students, including both children in the project and children on the waiting list. Estimates were then made of the differences between the attitude of project students and the attitude of waiting list students, in general, for all grades together, for Grade Two alone, for Grades Three and Four, for Grades Five and Six, and for Grades Seven and Eight. For each difference, a lower confidence limit was computed so that there is 95% confidence that the difference in attitude in general is greater than that lower limit. The mean attitudes and numbers of students in the project and the waiting list group are listed in Table 5, along with the difference between the sample means, the standard error of the difference, and the lower and upper limits of the 95% confidence interval.

TABLE 5
Confidence Limits For Differences In Attitude

	Waiting		Project			95% Confidence Limits		
	# of Subjects	Mean Attitude	# of Subjects	Mean Attitude	Standard Error of Difference	Lower Limit	Difference Between Sample Mean	Upper Limit
All Grades	668	2.797	735	2.890	.029	.036	.093	.150
Grade Two	16	2.097	33	2.162	.084	−.100	.065	.230
Grades Three and Four	293	3.049	324	3.078	.039	−.047	.029	.105
Grades Five and Six	144	3.015	255	2.938	.048	−.171	−.077	.017
Grades Seven and Eight	215	2.360	123	2.491	.053	.027	.131	.235

A comparison was also made, comparing the sttitudes of only project students in twelve of the twenty schools in the sample. The mean attitude, the standard deviation, and the sample size are shown in Table 6, along with the error variance, the F ratio, and the probability that the samples are indeed, random samples from a single population.

TABLE 6
Comparison Of Attitudes In Twelve Schools
For All Grades Together

Sample Size	Sample Mean	Standard Deviation
25	2.452	.400
84	2.924	.595
44	2.903	.394
18	3.128	.435
39	3.192	.431
41	3.156	.414
43	2.653	.536
38	3.055	.451
56	2.852	.603
61	3.156	.559
48	2.755	.467
61	2.902	.462

.402 = Mean Square within groups = Error Variance

666.06 = The F Ratio

.000 = The probability that the samples could have been chosen randomly from one population.

The probability indicated in Table 6 cannot really be zero. However, it is so small that it becomes zero when rounded off to three decimal places. Although there is nearly 100% confidence that there are, in general, differences in attitude between schools, comparing the mean attitude of the school with the most unfavorable attitude, namely 2.452, with that of the most favorable, namely 3.156, the difference is not so striking that it appears to be a very significant finding. Thus, there is near certainty that there are rather small differences between attitudes in the different schools.

The estimations of the differences in attitudes shown in Table 5 show that there is 95% confidence that any differences that there might be in general between the attitudes of project students and those on the waiting list are slight. For Grades two through Six, there is not even 95% confidence that the difference is even in favor or project students. For Grades Seven and

Eight and for all the grades together, there is 95% confidence that project students in general have a more favorable attitude toward mathematics than those on the waiting list. However, the differences are so slight that in the opinion of the evaluators, they can hardly be considered important. Indeed, since the attitudes were measured on a five point scale, it is again the opinion of the evaluators that even a difference of .235 on a five point scale is not enough to be considered noteworthy. Since there is 95% confidence that all of the differences are less than .235, and since there is 95% confidence that the differences for most of the grades are a great deal less than that, there is very little evidence to support any claim that the project has any considerable effect upon the attitude of students toward mathematics.

One may only conjecture why the project has no substantial effect upon the attitudes of students toward mathematics. Furthermore, this seems to contradict a later finding (Chapter III, Part A) that there is no worthwhile relation between attendance and achievement. If it is speculated that the reason that attendance has no worthwhile effect upon achievement is that by merely participating in the project a student is motivated to learn mathematics, then it would appear that this same student's attitude toward mathematics should be appreciably more improved than that of a student on the waiting list. Since this was not the case in this study, it may be that the project students do not associate the benefits of the project with mathematics itself, that is, whereas they may derive increased security and self-concept from participation in the project, they still maintain mildly unfavorable attitudes toward the actual subject matter of mathematics. It may be noted from Table 5 that the mean attitudes are generally about 3 or somewhat less than 3, which means that the overall attitudes toward mathematics of both project students and waiting list students are either neutral or somewhat unfavorable. Apparently, the initial attitudes of project students toward mathematics are sufficiently unfavorable so that the project has little or no effect upon them, even though the comparison of achievement presented earlier shows that there is at least 95% confidence that the project does indeed improve achievement.

III. IMPLEMENTATION OF EVALUATION OBJECTIVES 2 AND 3

A. Evaluation Objective 2

As indicated in Part B of Chapter I, Evaluation Objective 2 was to examine and appraise the procedures employed to achieve the stated objectives of the Corrective Mathematics Services Program.

Another way that was used to attempt to find some reasons for differences between schools and to give some recommendations for improving the instruction was to estimate the relations between the three scores of schievement gain and the attendance in the project for all grades together and for selected grades separately. As before, Grade Two had to be omitted because of the lack of achievement scores here. The sample correlation coefficients are shown in Table 7 below.

TABLE 7
Correlation Coefficients For Relations Between Three Scores Of Achievement Gain And Attendance For All Grades And For Selected Grades

	Computation	Concepts	Problem Solving
ALL GRADES	.03	.12	−.07
GRADES THREE AND FOUR	−.07	−.09	−.06
GRADES FIVE AND SIX	.27	.27	.12
GRADES SEVEN AND EIGHT	−.26	.14	−.36

The correlation coefficients are all too low to indicate any worthwhile relations. However, the data for these correlation coefficients is probably fairly good. Student attendance can surely be measured very accurately. Therefore, there is, indeed, high confidence, not that there *is* but that there *is not* any worthwhile relation between attendance and achievement. This result seems rather strange and unexpected; that is, it appears to be of little consequence whether a student's attendance is good or poor – he learns the same in either case. However, it simply may be that students who were in the project attended classes regularly, so that very minor fluctuations in attendance would have very little effect. Furthermore,

perhaps it was the mere fact that they were in the program that made them improve in their achievement and not the actual instruction that they received. Since the teachers who were interviewed almost universally stated that the students considered it a privilege, and not a stigma, to be in the project, it may be only this salutary effect of participation that was responsible for the overall gains of the program. Although this is only a conjecture, it is a possibility that might be given some serious thought. The reader should keep in mind, however, that although the correlation coefficients do indeed show high confidence that there is no worthwhile relation between attendance and achievement, no statistical analysis can ever tell why that is so.

Another study made in connection with Evaluation Objective 2 was an analysis of the ratings of eight teaching practices of the project teachers by the evaluators (See Appendix I.) A correlation coefficient was computed for the relation between the mean achievement of the project students in each school of our sample and the project teacher's total rating as well as for the teacher's rating on each of the eight teaching practices.

We hoped to ascertain some reason for the wide differences between schools (Tables 2A, 2B, and 2C.) Each project teacher in eighteen of the schools was rated on selected criteria by evaluators from New York University; correlation coefficients were then computed to estimate the relations between these ratings and the achievement of the students. There were eight criterion ratings at the start, with the mean of the eight ratings taken to be a ninth rating. The relations between these nine ratings and the three achievement scores thus yielded twenty-seven correlation coefficients, which are listed in Table 8.

TABLE 8

Correlation Coefficients For The Relations Between Three Scores Of Achievement Gain And Nine Variables Of Teacher Evaluation For Project Students Only And For All Grades Combined

	Computation	Concepts	Problem-Solving
Respect for Students	−.07	.32	.05
Teacher Expectation	.14	.37	.31
Authoritarianism	.03	.36	.22
Math Knowledge	−.00	.49	.29
Interest Students	−.04	.47	.10
Stimulate Questions	−.02	.44	.22
Individual Differences	.04	.21	.19
Open-Ended Questions	−.05	.56	−.03
Composite of Above	−.00	.46	.19

Although there were different numbers of students for the three achievement scores, there were approximately eight hundred students in all the grades together. Since the standard error of a correlation coefficient is $1/\sqrt{n-3}$, the standard error in this case is approximately $1/\sqrt{800} = .05$ and 1.65 times this standard error is about .08. Although Fisher's z' transformation is needed to normalize the distribution of correlation coefficients, even a casual observation of .08 less than each of the sample correlation coefficients above gives a rough approximation of the lower limit above which there is 95% confidence that the population correlation coefficient lies. And it can be seen thus even at a glance that the sample correlation coefficients in Table 8 are so low that they do not give even barely acceptable evidence of any worthwhile relation between any of the ratings and any of the three measures of achievement. In fact, taking .08 more than each of the above correlation coefficients, it can be seen that, in most cases, there is 95% confidence that there is not a worthwhile relation. Consider the highest correlation coefficient in Table 8, namely the correlation coefficient of .56 between the teacher's ability to ask open-ended questions and the student's performance on concepts. Since .56 + .08 = .64 which indicates what, in the opinion of some readers, may be considered to be a rather worthwhile relation, it cannot be concluded with 95% confidence that there is no worthwhile relation between the teacher rating of ability to ask open-ended questions and the students' achievement in the understanding of concepts. However, since .56 – .08 = .48 which is not very high either, there is also not 95% confidence that there is any very worthwhile relation whatever between that rating and understanding of concepts.

Since it seems absurd to conclude that there really is no worthwhile relation between the teacher's competence and the achievement of the students, one might speculate why these ratings failed to be even slightly related to achievement. A cursory glance at the rating scores revealed that one of the raters had very much higher ratings than the other raters. The teachers were rated by three members of the evaluating team. Although the raters tried to standardize their ratings, it appears that this standardization was not accomplished. Thus the rating was more a measure of the generosity of the rater than a measure of the ability of the teacher. Furthermore, the particular characteristics of the teachers that the evaluators attempted to rate might not have been very pertinent. The characteristics were chosen to be, at face value, those teacher traits that could reasonably be expected to be related to student achievement. Perhaps the wrong criteria were chosen.

One of the procedures employed in the program involved assigning of teachers in accordance with school needs. Certainly, the existence of a sizable waiting list in almost all of the schools indicates that an expansion of the program would be required in order to carry out this procedure satisfactorily. Moreover, the fact that 49 schools, or about one-third of the 149 schools in the program, received less than two days of service (See Chapter I, Part A) also indicates that an expansion of the program would be required in order to carry out this procedure successfully. We say this because we feel that each school should be serviced at least two full days a week since the occurrence of many school holidays makes this amount of service quite necessary in most cases. We draw attention to questions 6 and 7 on the Questionnaire to Project Teachers (Appendices IV and V) in this connection. Question 6 reads: "How many time a week do you meet each student in your program?" The mean response was 2.3 times (66 respondents). Question 7 reads: "Do you feel that the number of times given in Question 6 should be – decreased, left the same, or increased?" Weights of 1, 2, and 3 were assigned to the preceding responses, respectively. The mean response was 2.6. (64 respondents). Thus, these project teachers tended to think that the number of days of service for each student should be increased.

Another procedure employed in the program involved providing teachers with in-service training. We draw attention to the questions 12 through 19 in the Questionnaire to Project Teachers since they relate to the training experiences that have been offered to the project teachers. We also draw attention to questions 36 and 39 on the Questionnaire to Project Teachers. Question 36 reads: "How would you rate the training experiences you have received since entering the program in diagnosing the remediating pupils' learning difficulties in mathematics? (Check one): Very Helpful, Helpful, Little Help, and No Help." Weights of 1, 2, 3, and 4 were assigned to these responses, respectively with the mean response 2.4. (52 respondents). Question 39 reads: "How would you rate the training you have received in the use of appropriate instructional materials? (Check one): Very Helpful, Helpful, Little Help, and No Help." Assigning weights as in Question 39 we found the mean response to be 2.0. (63 respondents).

Another procedure employed in the program involved providing instructional materials and necessary equipment. We draw attention to the responses of the project teachers to Question 27 in the Questionnaire to Project Teachers. This question reads: "How useful do you find the materials which are provided for your classroom? (Check one): Very Useful, Somewhat Useful, Useless, Hinders Learning." Weights of 1, 2, 3, and 4 were assigned to these responses,

respectively. The mean responses of the project teachers was 1.16. (64 respondents). This signifies that in the opinion of these teachers the materials provided were rather useful.

A room deemed adequate for the needs of small group instruction was to be made available by the non-public school. In order to ascertain the degree to which this procedure was carried out, the evaluators appealed to Question 29 in the Questionnaire to Project Teachers. This question reads as follows: "How would you rate the room facilities provided for your corrective class? (Check one): Satisfactory, Unsatisfactory." Weights of 1 and 2 were assigned to the responses "Satisfactory," and "Unsatisfactory," respectively. The mean response was 1.2. (65 respondents). Thus, in the opinion of these teachers the room was a little less than satisfactory.

One of the procedures employed in the program was to give instruction to groups of approximately ten pupils. In this connection we draw attention to Questions 1 and 2 on the Questionnaire to Project Teachers. Question 1 asks the teacher for the total number of pupils in the corrective mathematics classes and Question 2 asks him for the total number of corrective classes he teaches. The total of the answers to Question 1 by the 64 project teachers was 3891 pupils. (65 respondents). The mean response to Question 2 was 7.3 classes per week. (65 respondents). From these data we find that "on the average" each corrective mathematics class had 8.3 pupils.

B. Evaluation Objective 3 (Recommendations)

1. The pre-testing must be done in the fall despite the complaint of the non-public school supervisors. For without both a pre-test and a post-test score obtained according to a consistent schedule, it is difficult to measure pupil progress validly.

2. The practice in some schools of having a corrective mathematics teacher see the same children on each of three or four days under an experimental program yielded significantly better results than those made by the children receiving two periods of remedial instruction. The practice should be extended.

3. The supervisors should extend the practice of working with, and talking to, individual children during their visits to the schools.

4. The corrective teacher should write some sort of progress report (not a grade) periodically during the year about each child in the corrective program. These reports might be sent home to parents and/or to the regular teacher.

5. Since the corrective math program is of a remedial nature, it seems advisable that the corrective mathematics teachers have adequate space to handle small workshops.

6. There should be more flexibility in corrective programs so that children could come in and out more easily during the academic year. (Subject to appropriate investigation.)

7. One-day-a-week service is practically meaningless. Not only do the child en involved forget almost everything from week to week, but with holidays, sickness, etc. the service, in reality, is truly tokenism.

8. Teachers need more training conferences, where they may work at the materials on an individual basis. It is not sufficient to have demonstration classes.

9. A workshop could be offered for the parents at each school. This way, the parents might be able to provide some home assistance which would reinforce the program. Perhaps the Board and an individual non-public school could share the responsibility (at least financially) of providing such a workshop.

10. Corrective mathematics teacher should reinforce topics treated in the regular classroom by teaching and developing closely related topics at appropriately correlated times.

11. There still is very little meaningful contact between the regular classroom teacher and the corrective teacher. At most, they usually only eat lunch together.

12. There should be some orientation provided for "new" regular classroom teachers so that they fully understand the purposes and procedures for the corrective mathematics program. Efforts should be made on the part of the coordinator in cooperation with the non-public school staff to this end.

13. Coordinators and supervisors can stimulate more interesting in the corrective math program by giving demonstrations or by explaining the program to the regular faculty of the school.

14. Corrective mathematics teachers should be available to attend a regular school faculty conference in the early fall.

15. Corrective teachers should be given *some* idea of how to handle minor emotional problems that they might encounter. Perhaps the Title I guidance counselor in a school might conduct a workshop to assist the corrective teachers.

16. Consideration should be given (subject to appropriate investigation) to dropping disruptive discipline problems from the program.

17. There are schools where it becomes virtually automatic for some children to go to the corrective mathematics class year after year. There should be some limits set on how long a particular student, who shows no or little sign of progress, would be permitted to continue in the program.

APPENDICES

APPENDIX I
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH PROJECT TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Teacher's Name _____ Observer _____

1. Total Number of Pupils in Corrective Classes _____
2. Total Number of Corrective Classes taught _____
3. Total Number of Pupils on Waiting List _____
4. Lowest grade level you teach _____
5. Highest grade level you teach _____
6. Educational background of project teacher:

College(s)	Degree(s)	Date(s)	Major(s)

7. List collegiate courses in mathematics and mathematics pedagogy which you have taken within the last five years.

_____

_____

8. Which of the courses listed in question 7 do you think have been the most helpful to you in your work in the corrective mathematics program? (List no more than five).

_____

_____

9. Teaching experience of project teacher:

Grade(s)	Subject(s) taught	No. of Years

10. Additional comments that might bear upon this evaluation.

_____

_____

_____

APPENDIX I -- (Continued)
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
RATING SHEET FOR CLASSROOM PERFORMANCE AND
GENERAL ACADEMIC ATMOSPHERE
CORRECTIVE MATHEMATICS PROGRAM -- 1971-1972

Name of School _____

Observer _____ Date _____

1.		Low = 1	2	3	4	5	6	7 = High
1.	Respect of the project teacher for the students	—	—	—	—	—	—	—
2.	The project teacher's expectation of the students' academic achievement	—	—	—	—	—	—	—
3.	Authoritarianism of the project teacher	—	—	—	—	—	—	—
4.	Project teacher's knowledge of subject matter	—	—	—	—	—	—	—
5.	Project teacher's ability to interest her(his) students	—	—	—	—	—	—	—
6.	Project teacher's ability to stimulate student questions and/or group discussion	—	—	—	—	—	—	—
7.	Project teacher's ability to provide for individual differences among students	—	—	—	—	—	—	—
8.	Project teacher's ability to ask open-ended questions	—	—	—	—	—	—	—

APPENDIX II
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH PRINCIPALS
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Principal's Name _____ Observer _____

1. What is the approximate enrollment of your school?

2. In what ways do you believe that coordinators and supervisors can be most effective in helping the project teacher to conduct the math program in your school?

3. How profitable do you feel this program is for your school?

4. Additional comments that might bear upon this evaluation.

APPENDIX III
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
GUIDELINES FOR INTERVIEWS WITH REGULAR CLASSROOM TEACHERS
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972

School _____ Date _____

Teacher's Name _____ Observer _____

1. Number of your pupils in Corrective Math Program _____

2. Grade Level _____

3. To what extent do your students miss regular academic work in order to attend the corrective mathematics class?

4. What kind of contact have you with the project teacher? Please state the frequency. In what ways would increased and/or different kinds of contact be more beneficial?

5. What reactions do you get from parents when they are told about their child's participation in the corrective mathematics program? How are parents informed of their child's progress over the year?

6. Additional comments that might bear upon this evaluation.

APPENDIX IV
TITLE I CORRECTIVE PROGRAM IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO PROJECT TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. Total number of pupils in your corrective math classes _____
2. Total number of corrective classes taught _____
3. Total number of pupils on waiting list _____
4. Lowest grade level you teach _____
5. Highest grade level you teach _____
6. How many times a week do you meet each student in your program? _____
7. Do you feel that the number of times given in question 6 should be:

   Decreased _____ Left the same _____ Increased _____
8. For how many years, including the present as one full year, have you taught in the corrective math program? _____
9. Give the total number of years you have taught in elementary or junior high school. Include the present year as one full year. _____
10. Check the degrees you hold:

    Baccalaureate _____ Masters _____ Doctorate _____
11. Please list any courses you are currently taking:

    _____

    _____

    _____

How would you rate the training experiences you have received since entering the program? (Refer to questions 12-17).

	Number Attended	Very Helpful	Helpful	Little or No Help	Harmful
12. Pre-training orientation meetings	_____	_____	_____	_____	_____
13. Weekly in-service sessions with supervisors	_____	_____	_____	_____	_____

	Number Attended	Very Helpful	Helpful	Little or No Help	Harmful
14. Sessions on job with supervisors					
15. Meetings at Board with coordinator					
16. Observations you make of other teachers in program					
17. Observations of you by supervisor and subsequent discussion with supervisor					

Which two of the foregoing experiences have you found to be the most valuable? Please list in order of value. (Refer to the number of the question.)

18. (First) _____

19. (Second) _____

20. What specific recommendations, if any, do you wish to make for the improvement of the pre-training orientation meetings at the New York City Board of Education at the beginning of the current academic year? If you did not attend any of these meetings, please check here ☐ and go on to the next question.

_____

_____

_____

21. If you usually attend weekly in-service sessions, please make specific recommendations for their improvement, if any. If you do not usually attend them, please check here ☐ and go on to the next question.

_____

_____

22. If you usually attend the large group meetings at the board office, please make specific recommendations for their improvement, if any. If you do not usually attend them, please check here ☐ and go on to the next question.

_____

_____

23. Suppose you were asked to design a one-semester course which would be required of corrective mathematics teachers at your grade level. List some of the topics, both mathematics and non-mathematical, which you would include.

_____

_____

_____

24. How often do you teach material that is closely related to that being currently taught in regular class? (Check One)

Often _____ Occassionally _____ Rarely _____

25. Please indicate the change that you have noticed in the pupils' attitude towards mathematics. (Check One)

Worse _____ Little or no change _____ Improved _____

26. Give your estimate of general parents' reaction to the corrective mathematics. (Check One)

Enthusiastic _____ Apparently pleased _____ Hostile _____

Noncommital _____ Dissatisfied _____

27. How useful do you find the materials which are provided for your classroom? (Check One)

Very useful _____ Somewhat useful _____ Useless _____

Hinders learning _____

28. Please give any suggestions you have for additional materials.

_____

_____

_____

29. How would you rate the room facilities provided for your corrective class? (Check One)

Satisfactory _____ Unsatisfactory _____

30. Please suggest how your contacts with supervisors can be made more helpful.

_____

_____

_____

31. Approximately what number of children are on a "waiting list" to enter your corrective class?

    Specify number_____

32. How successful do you believe you have been as a corrective teacher? (Check One)

    Very successful _____ Somewhat successful _____ Unsuccessful _____

33. What do you consider to be the major reason for any lack of success you may have experienced?

    _____

    _____

    _____

34. Do the students seem to think that attending the corrective mathematics program is a stigma, a privilege, or do they seem to be neutral? (Check One)

    Stigma _____ Neutral _____ Privilege _____

35. If your answer is "stigma" please suggest how this negative attitude might be improved.

    _____

    _____

    _____

36. How would you rate the training experiences you have received since entering the program in diagnosing the remediating pupils' learning difficulties in mathematics? (Check One)

    Very Helpful _____ Helpful _____ Little Help _____ No Help_____

37. Please state specifically those aspects of the training you received in diagnosing and remediating pupils' learning difficulties in mathematics that were the most helpful.

    _____

    _____

    _____

38. Please make specific suggestions for the improvement of the training you received in diagnosing and remediating learning difficulties in mathematics.

    _____

    _____

    _____

39. How would you rate the training you have received in the use of appropriate instructional materials?

Very Helpful _____ Helpful_____ Little Help _____ No Help _____

40. To what extent do you think you have succeeded in adapting your teaching techniques to meet the specific needs of disadvantaged children?

Great _____ Some _____ Practically zero _____ Zero _____

41. As a professional educator, please give a general evaluation of the corrective mathematics program.

_____

_____

_____

_____

_____

42. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

_____

_____

_____

_____

_____

APPENDIX V
DISCUSSION OF QUESTIONNAIRE TO PROJECT TEACHERS

We now present an analysis of the responses to certain questions on the Questionnaire for Project Teachers. In particular, we shall not analyze questions which call for suggestions on the part of the project teachers because many of the suggestions which appeared on the approximately 64 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: 3,891 pupils

Question 2: Mean response was 7.3 classes per week

Question 3: 4,276 pupils

Question 6: Mean response was 2.3 times per week

Question 7: We assigned weights of 1, 2, and 3 to the responses – Decreased, Left the same, and Increased, respectively. The mean response was 2.6.

Question 8: The mean response was 3.8 years

Question 9: The mean response was 6.7 years

Question 10: We assigned weights of 1, 2, and 3 to the responses – Baccalaureate, Masters, and Doctorate, respectively. The mean response was 1.5.

Question 12-19: We list the six training experiences given in these questions and alongside of each we give the mean number attended. Moreover, we assigned weights of 1, 2, and 3, respectively, to the responses: Very Helpful, Helpful, Little or no help, and Harmful, respectively. Beside the mean number of training experiences attended we give the mean response to the question by those who answered.

	Training Experience	Mean Number Attended	Mean Rating
12.	Pre-training orientation meetings	5.0	1.3
13.	Weekly in-service sessions with supervisors	2.3	1.6

Training Experience	Mean Number Attended	Mean Rating
14. Sessions on job with supervisors	8.4	1.3
15. Meetings at Board with coordinator	8.8	1.6
16. Observations you make of other teachers in program	.6	1.4
17. Observations of you by supervisors and subsequent discussion with supervisor	7.6	1.7

Questions 18 and 19: The respondents gave the following overall ranking (from most valuable to least) to these six training experiences: 15, 17, 14, 12, 16, and 13.

Question 24: Assigning the weights 1, 2, and 3 to the responses Often, Occasionally, and Rarely, respectively, we found that the mean response was 1.8.

Question 25: Assigning the weights 1, 2, and 3 to Worse, Little or no change, and Improved we found that the mean response was 2.8.

Question 26: Assigning the weights 1, 2, 3, 4, and 5 to the responses Enthusiastic, Apparently pleased, Non-committal, Dissatisfied, and Hostile, respectively, the mean response was 2.0.

Question 27: Assigning the weights 1, 2, 3, and 4 to Very useful, Somewhat useful, Useful, and Hinders learning, respectively, the mean response was 1.0.

Question 29: Assigning the weights 1 and 2 to the responses Satisfactory and Unsatisfactory, respectively, the mean response was 1.2.

Question 31: The mean response was 83 pupils.

Question 32: Assigning the weights 1, 2, and 3 to Very successful, Somewhat successful, and Unsuccessful, respectively, the mean response was 2.4.

Question 34: Assigning the weights 1, 2, and 3 to the responses Stigma, Neutral, and Privilege, respectively, the mean response was 1.6.

Question 36: Assigning the weights 1, 2, 3, and 4 to the responses Very helpful, Helpful, Little help, and No help, respectively, the mean response was 2.4.

Question 39: Assigning weights as in Question 36, the mean response was 2.0.

Question 40: Assigning the weights 1, 2, 3, and 4 to Great, Some, Practically zero, and Zero, respectively, the mean response was 1.7.

APPENDIX VI
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO PRINCIPAL
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. What percent of those students who qualify for admission to the corrective mathematics program are accommodated?

   _____ %

2. Give your estimate of regular staff members' reactions to the corrective mathematics program. (Please Check One)

   Enthusiastic _____ Apparently pleased _____

   Noncommital _____ Dissatisfied _____

3. Please add any suggestions you may have for improving staff reaction:

   _____

   _____

   _____

   _____

4. As a professional educator, please give a general evaluation of the corrective mathematics program.

   _____

   _____

   _____

   _____

5. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

   _____

   _____

   _____

   _____

APPENDIX VII
DISCUSSION OF QUESTIONNAIRE TO PRINCIPALS

We now present an analysis of the responses to certain questions on the Questionnaire for Principals. We shall not analyze questions which call for suggestions on the part of the principals because many of the suggestions which appeared on the approximately 84 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: The mean response was 38.3%.

Question 2: Assigning the weights 1, 2, 3, and 4 to Enthusiastic, Apparently pleased, Non-committal, and Dissatisfied, respectively, the mean response was 2.2.

APPENDIX VIII
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
QUESTIONNAIRE TO REGULAR CLASSROOM TEACHER
CORRECTIVE MATHEMATICS PROGRAM – 1971-1972
PLEASE RESPOND ANONYMOUSLY

1. Number of pupils in corrective mathematics program. _____

2. Grade Level that you teach _____ .

In general, how has participation in the corrective mathematics program changed students' *attitudes* toward the items referred to in questions 3 through 8? Next to each of these questions encircle the appropriate number according to the following code:

(1) Strengthened very much
(2) Strengthened somewhat
(3) Practically no change
(4) Weakened somewhat
(5) Weakened very much

3.	Mathematics:	(1)	(2)	(3)	(4)	(5)
4.	School, in general:	(1)	(2)	(3)	(4)	(5)
5.	Studying:	(1)	(2)	(3)	(4)	(5)
6.	Attendance:	(1)	(2)	(3)	(4)	(5)
7.	Volunteering in classroom:	(1)	(2)	(3)	(4)	(5)
8.	Himself:	(1)	(2)	(3)	(4)	(5)

9. Do the students seem to think that attending the corrective mathematics program is a stigma or a privilege or do they seem to be neutral? Please check one.

Stigma _____ Neutral _____ Privilege _____

10. If your answer to question 9 is "stigma", please suggest how this attitude might be improved.

_____

_____

11. To what extent, if any, do the children miss the *Subject matter* of their regular mathematics class in order to attend the corrective mathematics class? (Check One)

Great _____ Some _____

Practically Zero _____ Zero _____

In general, if students lose time in any regular class to attend corrective mathematics classes, does this create problems: (Refer to questions 12 through 17).

12. For the student? (Check One)

Yes _____ No _____

13. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

14. For the class? (Check One)

Yes _____ No _____

15. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

16. For you? (Check One)

Yes _____ No _____

17. If yes, please give your comments and/or suggestions for improvement:

_____

_____

_____

18. Is there sufficient contact between you and the project teacher for the teacher to be kept abreast of what is being taught in the regular classroom? (Check One)

Yes _____ No _____

19. Whose responsibility do you think it is to see that the project teacher is so informed?

_____

_____

_____

20. Are you kept abreast of what is being taught in the corrective class? (Check One)

Yes _____ No _____

21. Whose responsibility do you think it is to see that you are so informed?

_____

_____

_____

22. To what extent do you think that the corrective mathematics program has assisted the participating students in developing a sense of responsibility for their own learning activities: (Check One)

Great _____ Some _____

Practically Zero _____ Zero _____

23. As a professional educator, please give a general evaluation of the corrective mathematics program.

_____

_____

_____

_____

_____

24. As a professional educator, please give your major suggestions for the improvement of the corrective mathematics program.

_____

_____

_____

_____

_____

APPENDIX IX
DISCUSSION OF QUESTIONNAIRE TO REGULAR CLASSROOM TEACHERS

We now present an analysis of the responses to certain questions on the question for Regular Classroom Teachers. We shall not analyze questions which call for suggestions on the part of the regular classroom teachers because many of the suggestions which appeared on the approximately 147 completed forms have been incorporated into our recommendations in Part B of Chapter III.

Question 1: The mean response was 12.0 pupils.

Question 3: The mean response was 2.0 pupils.

Question 4: The mean response was 2.4 pupils.

Question 5: The mean response was 2.5 pupils.

Question 6: The mean response was 2.5 pupils.

Question 7: The mean response was 2.1 pupils.

Question 9: Assigning weights of 1, 2, and 3 to Stigma, Neutral, and Privilege, respectively, the mean response was 2.2.

Question 11: Assigning weights of 0, 1, 2, and 3 to Zero, Practically Zero, Some, and Zero, respectively, the mean response was 1.7.

Question 12: 43% answered Yes and 57% answered No.

Question 14: 23% answered Yes and 77% answered No.

Question 16: 39% answered Yes and 61% answered No.

Question 18: 71% answered Yes and 29% answered No.

Question 20: 63% answered Yes and 37% answered No.

Question 21: 47% said the project teacher, 37% said both teachers, 13% said the regular teacher. There were a few other scattered responses (approximately 3%).

Question 22: Assigning weights of 0, 1, 2, and 3 to Zero, Practically Zero, Some, and Great, respectively, the mean response was 2.6.

APPENDIX X
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
CORRECTIVE MATHEMATICS PROGRAM

ARITHMETIC INVENTORY – GRADES 2 – 6

School _____ Date _____

Name _____ Class _____

A. I like to wake up early in the morning.

1	2	3
never	sometimes	most of the time

B. I like to do arithmetic for fun.

1	2	3
never	sometimes	most of the time

1. I like doing arithmetic better than reading a story.

1	2	3
never	sometimes	most of the time

2. I think doing arithmetic is easy.

1	2	3
never	sometimes	most of the time

3. At home, I like to do my arithmetic homework first.

1	2	3
never	sometimes	most of the time

4. Looking at a lot of numbers scares me.

1	2	3
never	sometimes	most of the time

5. I think arithmetic is more like a game than like schoolwork.

1	2	3
never	sometimes	most of the time

6. I think about arithmetic when I have nothing else to do.

1	2	3
never	sometimes	most of the time

7. I give up fast when I cannot answer an arithmetic problem.

1	2	3
never	sometimes	most of the time

8. I like to do story problems.

1	2	3
never	sometimes	most of the time

9. I think working with numbers is fun.

1	2	3
never	sometimes	most of the time

10. I try very hard to understand arithmetic.

1	2	3
never	sometimes	most of the time

11. I get mixed up when I do arithmetic problems.

1	2	3
never	sometimes	most of the time

12. I do arithmetic puzzles just for fun.

1	2	3
never	sometimes	most of the time

13. When I have to do arithmetic in school I feel bad.

1	2	3
never	sometimes	most of the time

14. I like to count things.

1	2	3
never	sometimes	most of the time

15. I read books that tell about numbers.

1	2	3
never	sometimes	most of the time

16. I like to do all kinds of number problems.

1	2	3
never	sometimes	most of the time

17. Doing arithmetic makes me unhappy.

1	2	3
never	sometimes	most of the time

18. I think doing arithmetic is hard.

1	2	3
never	sometimes	most of the time

19. Doing arithmetic homework is fun.

1	2	3
never	sometimes	most of the time

20. I like to use numbers when I'm not in school.

1	2	3
never	sometimes	most of the time

APPENDIX XI
TITLE I CORRECTIVE PROGRAMS IN THE NON-PUBLIC SCHOOLS
CORRECTIVE MATHEMATICS PROGRAM

ARITHMETIC INVENTORY – GRADES 7 AND ABOVE

School _____ Date _____

Name _____ Class _____

A. I like to wake up early in the morning.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

B. I like to do mathematics for fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

1. I like doing mathematics better than reading a story.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

2. I think doing mathematics is easy.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

3. At home, I like to do my mathematics homework first.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

4. Looking at a lot of numbers scares me.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

5. I think mathematics is more like a game than like schoolwork.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

6. I think about mathematics when I have nothing else to do.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

7. I give up fast when I cannot answer a mathematics problem.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

8. I like to do story problems.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

9. I think working with numbers is fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

10. I try very hard to understand mathematics.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

11. I get mixed up when I do mathematics problems.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

12. I do mathematics puzzles just for fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

13. When I have to do mathematics in school I feel bad.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

14. I like to count things.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

15. I read books that tell about numbers.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

16. I like to do all kinds of number problems

1	2	3	4	5
never	sometimes	half the time	very often	all the time

17. Doing mathematics makes me unhappy.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

18. I think doing mathematics is hard.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

19. Doing mathematics homework is fun.

1	2	3	4	5
never	sometimes	half the time	very often	all the time

20. I like to use numbers when I'm not in school.

1	2	3	4	5
never	sometimes	half the time	very often	all the time