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ABSTRACT

On the basis of test results, high school background and degree objective, 25% of the 1970 freshman class at the City College of New York was assigned to a remedial math course. Students retested after 1 semester of remediation showed significant improvement, as compared to a control group who did not take a remedial math course. First semester grades revealed that two-fifths of the remedial students received non-pass grades. Failure rate for students going from Math 56 (remedial trigonometry) to Math 1 (beginning calculus) showed a non-pass rate of 77%. A control group of low ability students going directly into Math 1 had a non-pass rate of 81%. Results of questionnaires administered to students revealed general satisfaction with course, but only half of the students in Math 56 felt they knew material upon completion of the course. Math laboratories received strong support while tutoring was viewed as less helpful. Instructors indicated that most students were motivated but did not progress as rapidly as students in regular classes. Need for improving tutoring and laboratories was mentioned. (Author/HS)

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THE FIRST YEAR OF REMEDIAL MATHEMATICS INSTRUCTION UNDER OPEN ADMISSIONS

(a report on the results of several studies of the remedial math program at City College of New York)

By

Dan Berger

Report Number Nine

Office of Research and Testing
Department of Student Personnel Services
The City College of New York
New York, N. Y. 10031

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SUMMARY

On the basis of test results, high school background and degree objective, 25% of the 1970 freshmen class was assigned to a remedial math course. Criteria for placement and validity of the tests are described in the body of the report. Based on test results, about half the freshmen class was found to be deficient in high school mathematics. Test, grades, and attitudinal data are reported. Students re-tested after one semester of remediation showed significant improvement, as compared to a control group who did not take a remedial math course.

First semester grades revealed two-fifths received non-pass grades, with a majority (66%) of the failing group receiving J grades. Failure rate for students going from Math 56 (remedial trigonometry) to Math 1 (beginning calculus) showed non-pass rate of 77%. A control group of low ability students going directly into Math 1 had a similar non-pass rate (81%). Reasons for the apparent non-effect of Math 56 on passing Math 1 are discussed.

Results of questionnaires administered to students revealed general satisfaction with courses. Students in Math 54 indicated prior exposure to course content but this was not supported by grade distribution. Only half of the students in Math 56 felt they "knew material" upon completion of course. Math lab received strong support while tutoring was viewed as less helpful.

Instructors indicated via questionnaires that most students were motivated but did not progress as rapidly as students in regular classes. Mention was made on improving tutoring and lab.

INTRODUCTION

Approximately one-fourth of the 1970 freshmen class was assigned to remedial mathematics courses at the City College of New York. The purpose of this report is to present data that has been gathered on these students. Hopefully, this information will be used in evaluating various aspects of the remedial program.

Three types of data were gathered:

a) Test data: All students were administered a mathematics test prior to registration. The test and testing results are described in another section.

b) Attitudinal data: Both students and instructors completed attitude questionnaires concerning opinions of the courses and course content.

c) Grades

PLACEMENT IN MATHEMATICS

Six remedial courses in mathematics were offered in the Fall 1970 semester. They were:

Math 50	- A review of Algebra and Geometry for students not planning to take Calculus
Math 50.1	- Elementary Algebra
Math 50.2	- Plane Geometry
Math 54	- Basic Essentials of Algebra and Geometry
Math 55	- Intermediate Algebra and Some College Algebra
Math 56	- Trigonometry

The remedial mathematics courses are organized in two different sequences. Math 50.1, 50.2 or 50 are intended for students who need to fulfill the college entrance requirements of elementary algebra and geometry, and who do not plan to take Calculus. The other group of courses is the Pre-Science sequence and consists of Math 54, 55 and 56. Students in this sequence of courses are those who plan to take Calculus. A Freshman with minimal knowledge of math may be required to take 50.1 before 54.

Placements in mathematics are determined by a students' high school background in mathematics, degree objective and test score. Using these criterion, the freshmen class of 2440 was divided into the following remedial course assignments.

TABLE 1

PERCENT OF 1970 FRESHMEN CLASS ASSIGNED TO REMEDIAL MATHEMATICS

Course	Percent Assigned
Math 50	4%
Math 50.1	6%
Math 50.2	3%
Math 54	5%
Math 55	4%
Math 56	4%
	26%

THE CCNY MATH PLACEMENT TEST

The test used for evaluating mathematics placement was developed by the Mathematics Department. It consists of four parts covering four areas of high school mathematics: Elementary Algebra, Plane Geometry, Intermediate Algebra and Trigonometry.

Prior to its first use in 1970 the test was carefully reviewed by faculty members of the Mathematics Department and Office of Research and Testing. It was considered to have content validity and to be suitable for use in a freshmen testing program.

After the initial administration of the test, more formal statistical analysis were conducted. Table 2 contains correlations between the results of three math tests and grades in Math 1, the introductory calculus course.

TABLE 2

CORRELATIONS* BETWEEN TEST RESULTS AND GRADES FOR MATH 1
N=520 STUDENTS

	O. A. T. Math	CCNY Math	S. A T. Math	Math 1 Grade
Open Admissions Test-Math	1.00	.33	.38	.22
CCNY Math Test		1.00	.43	.40
S. A. T. (math)			1.00	.30
Math 1 grade (A=4.... F=0)				1.00
Mean Scores	36	29	554	1.6
Standard Deviations	4.57	4.80	78.47	1.4

* (All correlations significant at .01 level or beyond)

The relatively high correlations between the CCNY math test and grades suggests that of the three tests, it is most suitable for evaluation of mathematics knowledge and subsequent placement.

A Kuder-Richardson Formula 20 reliability coefficient was computed on the full sample of 2440 freshmen taking the test. The result was a reliability coefficient equal to .83, suggesting that the test is internally consistant and most items tap a similar area of knowledge (e.g. high school mathematics).

Table 3 is a summary of how the freshman class was distributed on the 40 item test.

TABLE 3

CUMULATIVE PERCENTILE DISTRIBUTION OF FRESHMAN CLASS ON CCNY MATH PLACEMENT TEST. N=2552 STUDENTS (112 DID NOT REGISTER)

Score	Cumulative Percentile
40	99
37	95
35	90
32	80
29	70
27	60
24	50
22	40
19	30
16	20
12	10
8	5

A score of 24 on the math test indicates that a student has a sufficient grasp of high school mathematics to begin calculus. As can be seen, half of the freshmen class scored at this level or above. Of the 50% who scored below 24, about half planned to major in areas not requiring advanced mathematics. These students are not required to take remedial mathematics, if they have had 1 year each of Algebra and Geometry in high school.

RESULTS OF RE-TESTING STUDENTS ENROLLED IN REMEDIAL COURSES

A few classes in each remedial course were re-tested with an appropriate part of the math test at the end of one semester. Each part of the test contains ten items. Table 4 summarizes the results of re-testing.

TABLE 4

PRE AND POST TEST RESULTS OF FRESHMEN ENROLLED IN REMEDIAL MATH COURSES

COURSE[1]	PART USED	N	MEAN PRE-TEST	MEAN POST-TEST	CHANGE
50.1	1	14	1.86	6.06	+4.20*
50.2	2	10	2.50	3.92	+1.42*
54	1	13	5.61	8.57	+2.96*
55	3	49	2.80	5.82	+3.02*
56	4	50	2.70	5.75	+3.05*

[1] Sample size for Math 50 was too small to include in a table

* Significant at .05 level or beyond

A statistical test for the significance of the differences (t - test for correlated samples) for these scores indicated that all the change scores were significant at the .05 level or beyond.

These results are encouraging as to the effectiveness of instruction in the remedial classes. They indicate that the average student improved sufficiently so that had he retaken the complete placement test he would have placed in the next higher category in mathematics. However, the results must not be taken as complete and accurate indicators of student improvement. The following should be taken into consideration:

1. The same test was used for pre and post testing. Therefore, students may have retained some knowledge of the earlier test over the eight month interval between test administrations.

2. The two testing sessions were dissimilar. The first test was administered for purposes of placement and was part of a four test freshman test battery. The post test session, however, was part of a final examination which may have increased student motivation.

The results presented in Table 4 can be compared with test results from another sample of students. This second group of students were also in need of remediation, but because of limited space or individual program problems, they delayed enrolling in remedial math courses until the Spring Semester. They were retested during the first three weeks of classes. These students may be considered a control group paralleling the enrolled remedial group in ability and all experiences except that of actually taking a remedial course. Table 5 summarizes testing results for this group.

TABLE 5

PRE AND POST TEST RESULTS OF STUDENTS NOT ENROLLED IN REMEDIAL COURSES

COURSE[1]	PART USED	N	MEAN PRE-TEST	MEAN POST-TEST	CHANGE
50.1	1	12	2.8	3.1	+ 0.3
50.2	2	7	3.3	2.3	- 1.0
54	1	9	5.2	7.8	+ 2.6*
55	3	8	2.8	3.1	+ 0.4

[1] Sample size for math 50 and 56 was too small to warrant inclusion in this table

* Change significant at the .05 level (t - test for correlated sample)

In comparing Tables 4 and 5 the differences in change scores suggests that simply enrolling in college or having taken the test eight months earlier would not account for the improvement noted in Table 4. However, once again the results must be taken with a grain of salt. The group represented in Table 5 may not be a true control group. Many of them may have decided not to take math during the first semester because of dislike for the subject, but were "forced" to take it in the spring semester. Furthermore sample size was comparatively small for the control group and adding a small number of students may have affected the results significantly.

Nevertheless the data so far is in a positive direction and lends support to the effectiveness of remediation.

GRADES IN REMEDIAL MATH COURSES

Table 6 summarizes the percentage of students receiving J or F grades in Fall remedial math courses.

TABLE 6

PERCENTAGE OF STUDENTS RECEIVING NON-PASSING GRADES IN FALL 1970 MATH COURSES

COURSE	Total enrollment	Percent E, F, G, H	Percent J*	Percent E, F, G, H or J
Math 50	51	14%	35%	49%
Math 50.1	111	14%	25%	39%
Math 50.2	25	24%	16%	40%
Math 54	66	15%	23%	38%
Math 55	94	6%	30%	36%
Math 56	84	12%	19%	31%
All Remedial Math Courses	431	13%	25%	38%

* A grade of J signifies a withdrawal without failure

As can be seen in Table 6, a relatively small percentage (13%) of all students taking remedial math received failing grades. A larger percentage (25%) received J grades. This latter group consists of students who actually withdrew and those who studied but did poorly on examinations. It was decided not to penalize this latter group with an F grade, but simply to require them to repeat the course.

60 students who were in the remedial math courses in the Fall Semester went on to take regular college math courses in the Spring. Table 7 summarizes percentage of these students who received non-passing grades of E, F, G, H or J.

TABLE 7

GRADES OF STUDENTS IN REGULAR COLLEGE MATH COURSES WHO COMPLETED A REMEDIAL COURSE IN THE PREVIOUS SEMESTER

Remedial Course	Regular Course	Total Number of Students	Percentage of total receiving non-passing grades (i.e. E, F, G, H, J)
Math 50	Math 64	10	60%
Math 50.2	Math 64	3	67%
Math 56	Math 1	29	77%
Math 56	Math 43	10	50%
Math 56	Math 61	8	25%
	Total	60	62%

As can be seen in Table 7 the majority (62%) of students who completed a remedial course and continued on to a regular course did not pass the second course. The figures mentioned above reveal little as to the effectiveness of the remediations. What is needed is a comparison group.

Data available on freshmen who went directly into Math 1 without taking a remedial course may shed light on the effectiveness of remediation. Of this group, 31% received a non-passing grade. In comparing this figure with the figure of 77% for the Math 1 students represented in Table 7, we can conclude that the students completing Math 56 and then going on to Math 1 were not brought up to the same level of ability as those who went directly into Math 1. It should probably not be expected that students with one semester of remedial work can achieve at the same level of performance as students who did well on the math placement test and went directly into Math 1. This latter group contained a large number of superior math students as indicated by their performance on the math placement test. A one semester remedial course should not be expected to raise students to the same high level of functioning.

A more suitable group of students for comparisons would be those students in Math 1 who received the minimum placement score (22) for admission to the class. Twenty seven students earned this score. These students were only slightly better than those who went into Math 56 (score range of 20 to 21). Of the group who scored 22, 81% received non-passing grades in Math 1. In comparing this to the nearly equivalent group who had Math 56 and then took Math 1, we find a difference of only 4 percentage points in non-pass rates.

In conclusion, those students who took Math 56 and then Math 1 hardly improved their chances of passing Math 1. The remedial math course, Math 56 would seem to have had little effect in improving their chances of passing Math 1.

The results of the attitude studies reported in the next section indicate some of the reasons for this lack of effect. An immediate result however was to change placement procedures into math courses. The change was to weight the difference parts of the math test, which should have the effect of more accurately placing students.

RESULTS OF MATHEMATICS QUESTIONNAIRE ADMINISTERED TO STUDENTS ENROLLED IN REMEDIAL COURSES DURING THE FALL 1970 SEMESTER.

In January 1971, students enrolled in Math 50, 50.1, 50.2, 54, 55 and 56 were administered a questionnaire that dealt with attitudes towards Mathematics Remedial Courses. The questionnaire dealt with such areas as attitudes toward teacher, attitudes toward usefulness of math, and attitudes toward teaching materials. A copy of the questionnaire may be found in the appendix of this report. The questionnaire contained 18 questions or statements for which the student indicated his degree of agreement. Questions 19 to 24 were open-ended and permitted the student to respond in any way that he wished. That is, for these five items he was not restricted to a specific set of responses as are typically found in multiple choice questions.

Since the questionnaire was administered in January, attendance was rather spotty and only approximately half of the students enrolled in the courses had an opportunity to fill out the questionnaire. A total of 216 students filled it out. Table 8 summarizes the results. The analysis of the data was divided into a priori attitudinal areas.

In the following discussion, mention will be made of Science Remedial Courses and Non-Science Remedial Courses. Math 54, 55 and 56 are considered Science Remedial Courses in that they are designed for students majoring in various scientific disciplines. These are the students who will go on to take regular college math courses. Math 50, 50.1 and 50.2 are intended for students who are not likely to take additional math courses.

Attitudes Toward the Course in General (Questions 1, 2, 3, 4, 5 and 6)

As indicated by responses to question one, 55% of the students felt they were learning more in the math courses they were taking when compared with courses taken in High School. Relatively few (19%) found their current math course useful for doing work in other courses (question 2). This is more true for students in the non-science track than for students in the science remedial courses. A significant majority (73%) of the students, however, indicated that they feel the course will be useful for work in future courses (question 3). As expected, this figure is even higher when we look at the responses of students in the science sequence. Most (63%) students stated that much of the material that was covered in their current math course was also covered in previously taken High School math courses (question 5). This is particularly true of students enrolled in Math 54, of whom 92% report having been taught this material in High School. One third of the students felt that they must work harder for their math course in comparison to other courses (question 6). About half the respondents in Math 50 (58%) and 50.1 (42%) felt their courses particularly tough in comparison to other courses they were taking (question 6).

TABLE 8
MATHEMATICS QUESTIONNAIRE FOR REMEDIAL COURSES

	Percent Agree						
	Total (216)	50 (24)	50.1 (48)	50.2 (15)	54 (25)	55 (51)	56 (53)
1. In comparison to math courses I've taken in high school, I'm learning more in the math courses I'm now taking at City College	55%	50%	66%	60%	44%	55%	51%
2. The math course I'm now taking is useful for doing work in other courses I am currently taking.	19%	16%	8%	20%	12%	32%	22%
3. I expect that the math course I am now taking will be useful in future courses I will take at City College	73%	50%	66%	66%	88%	90%	69%
4. The math course I am now taking is important for doing work in my future career.	50%	41%	40%	20%	64%	58%	55%
5. Much of the material that is being taught in my math class was covered in my high school math courses.	63%	54%	44%	74%	92%	58%	75%
6. In comparison to other courses I am taking at City College I am working harder for the math course I am now taking.	33%	58%	42%	20%	24%	28%	27%
7. My current math instructor is better teacher than most of the math teachers I've had in the past.	50%	66%	71%	40%	56%	35%	42%
8. I am certain I will pass the math course I am now taking	68%	37%	69%	80%	84%	64%	76%
9. My math instructor is helpful when I am having difficulty with my work.	74%	79%	83%	67%	72%	65%	78%
10. In general the mathematics program (e.g., books, lab, teaching, etc.) is helping me learn mathematics.	63%	72%	67%	80%	72%	68%	49%
11. In the math course I am now taking I am evaluated in a fair and impartial way.	65%	75%	50%	73%	68%	65%	72%
12. I am confident I will do well at City College	62%	62%	54%	49%	68%	67%	64%

TABLE 8 (Continued)

MATHEMATICS QUESTIONNAIRE FOR REMEDIAL COURSES

	Percent Agree						
	Total (216)	50 (24)	50.1 (48)	50.2 (15)	54 (25)	55 (51)	56 (53)
13. I have heard of the Math Lab.	97%	100%	96%	94%	92%	100%	98%
(13a. Percent who attended Math Lab)	80%	71%	79%	87%	72%	88%	74%
14. I found the Math Lab helpful (answer only if you attended the Lab). (Based on % responding to this question).	61%	64%	55%	46%	55%	66%	66%
15. I have heard of the mathematics tutorial program	72%	86%	62%	80%	68%	78%	69%
(15a. Percent who received tutoring).	29%	29%	52%	33%	24%	20%	19%
16. I found the mathematics tutorial program helpful. (answer if you had a math tutor). (Based on % responding to this question).	48%	56%	44%	60%	33%	70%	40%
17. I should have been placed in a more advanced math course.	32%	33%	23%	46%	52%	22%	38%
18. I should have been placed in a less advanced math course.	6%	8%	14%	13%	4%	4%	4%

TABLE 8 (Continued)
MATHEMATICS QUESTIONNAIRE FOR REMEDIAL COURSES

	T	50	50.1	50.2	54	55	56
19. What did you like most about your math course ?							
1. Lab	0%	0%	0%	0%	0%	2%	0%
2. Teacher	23%	29%	25%	27%	24%	16%	23%
3. Tutoring	0%	0%	0%	0%	0%	0%	0%
4. Whole course, everything	4%	0%	0%	0%	4%	4%	9%
5. Book	1%	0%	0%	0%	0%	2%	2%
6. Learned, liked Math	7%	8%	12%	13%	8%	4%	2%
7. Review preparation	12%	8%	6%	20%	16%	18%	9%
8. Blank, nothing	30%	21%	35%	20%	20%	33%	34%
9. Other	23%	33%	21%	20%	28%	22%	21%
20. What did you like least about your Math course?							
1. Lab	4%	4%	4%	7%	0%	4%	4%
2. Teacher	12%	8%	6%	7%	0%	27%	11%
3. Tutoring	0%	0%	0%	0%	0%	0%	0%
4. Whole course, everything	3%	0%	2%	7%	8%	2%	2%
5. Book	4%	0%	2%	0%	8%	8%	4%
6. Knew material previously	13%	4%	10%	20%	24%	8%	17%
7. Tests	1%	4%	2%	0%	0%	0%	2%
8. Blank, nothing, uncertain	34%	37%	35%	27%	32%	31%	38%
9. Other	23%	33%	27%	13%	20%	18%	23%
10. No credit	6%	8%	10%	20%	8%	2%	0%
22. On one or two words please indicate what kind of job you wish to have when you finish your education?							
1. Teacher, working with kids	21%	50%	40%	27%	8%	10%	6%
2. Engineer	25%	8%	6%	7%	28%	37%	40%
3. Architect	6%	0%	6%	0%	0%	8%	13%
4. Medicine	14%	12%	17%	20%	20%	16%	8%
5. Business world	3%	0%	2%	0%	4%	6%	2%
6. Natural Sciences	5%	4%	0%	0%	20%	4%	6%
7. Social Sciences	3%	4%	6%	7%	0%	0%	2%
8. Uncertain, Blank	15%	8%	12%	27%	8%	18%	17%
9. Other	8%	12%	10%	13%	12%	2%	8%

TABLE 8 (Continued)
MATHEMATICS QUESTIONNAIRE FOR REMEDIAL COURSES

	T	50	50.1	50.2	54	55	56
23. Suggestions you may have in improving Math course							
1. Give credit	6%	17%	10%	20%	8%	0%	0%
2. Better book	7%	4%	0%	13%	12%	8%	9%
3. More tutoring individual help	0%	0%	0%	0%	0%	0%	2%
4. Better teacher	9%	0%	4%	0%	4%	22%	9%
5. Improve lab	1%	4%	2%	0%	0%	0%	2%
6.	0%	0%	0%	0%	0%	0%	0%
7.	0%	0%	0%	0%	0%	0%	0%
8. No suggestions or Blank	54%	50%	58%	47%	40%	55%	56%
9. Other	21%	25%	25%	13%	36%	14%	19%

24. Please check Math course you are taking:	
1. 50	11%
2. 50.1	22%
3. 50.2	7%
4. 55	24%
6. 56	25%

Attitudes Towards Instructor (Questions 7, 9 and 11)

One half of the students felt that their math instructor was better than most math teachers they have had in the past (question 7). Instructors of the science remedial courses seem to be not as highly favored as the non-science remedial instructors. The majority (74%) of students indicated in their response to question 9 that they found their math instructor helpful when they were having difficulty with their work. 65% felt that they were evaluated in a fair and impartial way by their instructor (question 11).

Students' Self-Perception of Performance in Class (Questions 8, 10 and 12)

With the exception of one course, the majority (68%) of the students enrolled in the remedial courses indicated that they felt fairly certain they would pass (question 8). The exception to this is Math 50 where only 37% felt confident that they would pass. The majority (63%) of the students responding indicated that, generally speaking, the mathematics program is helping them to learn math (question 10). The students enrolled in Math 56, however, had less (49%) general agreement with this statement.

Most (62%) of the students indicated confidence in their ability to get good grades at City College (question 12).

Attitudes Towards Math-Lab and Tutoring (Questions 13, 14, 15 and 16)

Almost all students enrolled in remedial courses had heard of the Math-Lab (question 13 - 97%). Of those who attended (80% - question 13a) approximately two-thirds (61%) found the Math-Lab helpful (question 14). A lesser percentage (72%) of the students had heard of the Tutorial Program (question 15). Of students that sought help (29% - question 15a) in the Mathematics Tutorial Program, approximately half (48%) found it helpful (question 6). Students enrolled in Math 55 found tutoring more useful than students enrolled in the other remedial math courses (question 16 - 70%).

Attitudes Towards Placement (Questions 17 and 18)

One third (32%) indicated that they should have been placed in a more advanced course (question 17). An even greater percentage (52%) of the students enrolled in Math 54 indicated feeling this way. In response to question 18, relatively few (6%) felt they should have been placed in a less advanced math course.

What Did You Like Most About Your Math Course? (Question 19)

As mentioned in the introduction, for the last group of items in this questionnaire, students did not have a fixed category of responses from which to choose. Rather,

they could write in any response they wished. 30% of the students did not respond in any way to question 19. The most liked aspect of the program, judging from those who did respond, was the teacher (23%). The next most common response was a general category dealing with an appreciation of the review and preparation the students were receiving (12%).

What Did You Like Least About Your Math Course? (Question 20)

This was also an open-ended question in which the students could fill in their own answers. One third (34%) chose not to respond to this question. The most common complaint of those who did respond was directed to the teacher (12%) or that they knew the material previously (13%). Surprisingly, relatively few (6%) of the students complained about the fact that the mathematics course they were taking was not a credit bearing course. A minor exception to this is found in Math 50.2 where one fifth of the students complained about the lack of credit.

Future Occupational Prospects (Question 22)

In this question, students were asked what occupation they wished to have when they finished school. The two most common responses were teacher or youth workers (21%) for the non-science students, and engineer for the science students (25%). The next most common occupational category was that of medicine, (14%) which included both physician and nurse. Equal numbers of students in the Science and Non-Science Remedial sequences indicated interest in medicine.

Suggestions for Improving Math Courses (Question 23)

Only about half (46%) of the students suggested ways of improving the course. The most common response (15%) for the Non-Science Remedial sequence was to give credit. A relatively large percentage of the students enrolled in Math 55 (22%) suggested improvements on the part of the teacher (teaching style, voice, etc.).

Conclusions and Recommendations

1. As indicated in the relatively positive responses to questions 1 through 6, students seem generally satisfied with the courses as a whole.

2. The majority of students who responded to this questionnaire had a relatively positive perception of themselves in terms of their ability to get good grades in mathematics.

3. Only about half of the students who attended the Mathematics Tutorial Program found it helpful. It is therefore suggested that this program be reviewed for the coming year.

4. Since one third of the students felt they were not placed in the proper math course, it is suggested that students have an opportunity to discuss math placement during or before registration and that they have an opportunity to switch after the first week or two of classes. However, dissatisfaction with math placement may be reduced this year by the changes in the CCNY Mathematics Placement Test and placement procedures.

5. Results of this questionnaire are somewhat inconclusive due to the fact that approximately one half of the students enrolled in remedial courses were not present at the time of the questionnaire administration. There is a strong possibility that their non-attendance was an indicator of their negative attitudes and the results of the survey would have been significantly different had these students filled it out. In the future, it is recommended that the questionnaire be administered earlier in the term so as to catch more of these students.

   The anonymity of the questionnaire prevented an analysis of how grades were related to attitudes. Future questionnaires should include students' names.

6. The results of this questionnaire suggest some reasons for the poor performance of students going on to regular college math courses after completing Math 56. Only about half the students in Math 56 felt that overall the math program was helping them to learn mathematics (question 10), as compared to 67% to 80% for the other remedial courses. This group therefore had some feeling of their lack of preparedness for taking regular college math courses.

   Furthermore only 19% received tutoring and of this group only 40% felt they were helped. This suggests a double pronged approach. One is to urge students to attend the tutoring program and the other is to improve tutoring so that it will better meet the needs of the students.

QUESTIONNAIRE ADMINISTERED TO INSTRUCTORS OF REMEDIAL MATH COURSES

Shortly after the end of the fall semester 28 instructors of the remedial courses were asked to fill out a questionnaire concerning the students and course content. A copy of the questionnaire may be found in the appendix of this report. Tables 9 and 10 summarize the results.

TABLE 9

RESULTS OF QUESTIONNAIRE ADMINISTERED TO INSTRUCTORS OF REMEDIAL MATH COURSES

N=28 Instructors

	Total N=28	50, 50.1 50.2 N=12	54, 55, 56 N=16
1. Percent who felt students in class were sufficiently homogenius to permit effective teaching	62%	67%	59%
2. Percent who felt that students progressed as rapidly as regular freshman math classes	25%	33%	19%
3. Percent who felt that meetings were worthwhile	64%	58%	69%
4. (Classes taught)			
5. Mean percent of students who should have taken less advanced courses	18%	19%	17%
6. Mean percent of students who should have taken more advanced courses	12%	14%	10%
7. Mean suggested class size	14	13	16
8. Comparison of motivation with regular classes: Percent who felt students were:			
less motivated	32%	42%	25%
as motivated	50%	42%	56%
more motivated	18%	17%	14%
9. Percent who felt credit or no credit should be given:			
no credit	57%	83%	38%
1 credit	14%	8%	19%
2 credit	20%	8%	31%
3 credit	7%	0%	12%

The verbatim responses of instructors responding to the open ended questions are presented in Table 10. No attempt was made to analyze these statements.

Most instructors (62%) felt that the students were similar enough in ability for effective teaching (question 1). Only one-fourth of the instructors felt that their students progressed as rapidly as students in regular classes (question 2). The figure, however, was even lower (19%) for students in the science remedial math courses. Most (64%) of the instructors felt that the meetings held once a week to discuss mutual problems were worthwhile (question 3). A third of the instructors felt that students were placed too low (18%) or too high (12%) (question 6). The average suggested class size was 14 which is consistent with actual class size of 15 (question 7). Most (68%) of the instructors indicated that students were as or more motivated than regular math students (question 8). Generally speaking, instructors of non-science (83%) remedial courses feel that students should not receive credit, while instructors of science (62%) remedial courses feel credit should be given. These attitudes are consistent with actual practice whereby credit is given for Math 55 and 56.

TABLE 10
RESPONSES TO OPEN ENDED QUESTIONS IN FACULTY QUESTIONNAIRE

Ques. 10 DO YOU HAVE ANY COMMENTS CONCERNING THE MEETINGS FOR TEACHERS OF OPEN ADMISSIONS CLASSES?

"I never found them of much use."
"Teachers teaching the same course should get together."
"No."
"Mostly unnecessary."
"People teaching the same course should get together."
"I think that the information given at these meetings could be equally well imparted by notes to the teachers."
"Meetings are all right for discussing books and syllabus, but do not add anything to the teaching of the course. This should lie within the individual teacher."
"None."
"The meetings for teachers of open admissions classes mean well, but usually there are problems brought in and very seldom an effective solution is found."
"Too much time spent listening to other peoples' problems (e.g. different courses). Perhaps could do more in writing and individual, optional conferences between section head and instructors."
"Very helpful."
"Fewer and more to the point."

Ques. 11 DO YOU HAVE ANY COMMENTS OR SUGGESTIONS CONCERNING THE OPEN ADMISSIONS MATH PROGRAM (e.g. lab., tutoring, syllabus, placement, teaching)

Math 50 "Be more strict with attendance."

50.1 "I am teaching 50.1 at a quicker pace this term (Spring) and am finding the students equally receptive. It seems to me that the best way to get to these students is having them attempt examples at their seats immediately after a topic has been covered, as well as checking on their homework. If that is done, they can absorb more material than they are given credit for."

"Lab hours should be scheduled in advance, with attendance required. Perhaps an attempt might be made, in placement testing to measure aptitude as well as knowledge, so that bright students with poor background might go directly on their own. In general, I would favor a system of more lab, less formal instruction."

TABLE 10 (Continued)

"I strongly believe credit should not be given for remedial, non-college work. More and better advisement and placement would help, especially for freshmen."

Math 50.2

"Labs should be under control of individual teacher (as they are now), tutoring should be as available as possible."

"As far as I am concerned the labs of last semester were a total failure. What is being done now is much better."

"The placement for my remedial course was fairly accurate, but many students in my Math 1 class should not have been placed in such an advanced course. Many were extremely weak in algebra and analytic geometry."

Math 54

"The classes can be made homogeneous even though they do not always end up that way. The students whose problem is Spanish language vs English language but whose motivation is high should be so treated rather than placed in sections with students of mediocre ability. The lab is a good idea but should not be made part of the course."

"Lab tutoring should be run on a much stricter basis."

"Use the present Math 50 book in Math 54."

"The 'free' labs are an excellent idea and should be continued to the extent the demand justifies. The syllabus should be more detailed and better thought out now that some experience has been gained. There seems to be a large overlap between 54 and 55 which may give some students the impressions they are on an endless treadmill."

Math 55

"Obtain data on how students do after placement. Example: People who didn't pass 55 had to take 55 again or 43. Determine which placement was more effective. Give all students the placement test after completing each remedial course to get objective measure of progress."

"Candidate for BA (e.g. non-science students) take remedial work after successful completion of one year of work at the college. Reasons:

1. Cut down on number.
2. Students with a year's work toward degree-better motivated.
3. Math will not be blamed for discouraging first year students who drop out."

TABLE 10 (Continued)

Math 56	"Dispense with labs."
	"I think it's being handled about as well as possible. Perhaps the placement might be a little more accurate."
	"I think that placement should be based on more factors (e.g. high school average should be considered; grades in high school math courses)."
	"I also suggest that students with H.S. averages - 80, could be raised to 82 or so, with two years of H.S. math, who do poorly on our placement exam be permitted to take a slow version of 64 (meeting 5 times a week)."
	"Lab is useful."
	"One problem of placement into Math 56 seems to be that students who have forgotten trig. get put there. They then find the course boring and do not work (even though, if they did work they would learn something). These people should go into Math 1."

CONCLUSIONS AND RECOMMENDATIONS

1. A third of the students indicated in item 17 that they should have been placed in a more advanced course. However, in view of the relatively high non-pass rates it is perhaps best that this was not done. Nevertheless, attempts should be made to individualize placements as much as possible. The retest system that allows a student's placement to be changed as late as the second week of the semester should be continued.

2. Nearly all students in Math 54 indicated having covered the material previously (question 5). However, their self-perception was not supported by their grades (Table 8). This may suggest the need for "reality testing" in which students are given more feedback on lack of knowledge. Pre and post tests for each unit may be useful in accomplishing this.

3. Continuation of the math lab can be recommended on the basis of student approval of it (items 13 and 14). Tutoring did not receive support (item 16) and reorganization of this activity is recommended. In a survey conducted by the Office of Research and Testing, 11 of 35 Mathematic Department tutors surveyed indicated a need for increased training and orientation in handling their tutoring duties. A program more closely tied to actual classroom work, where tutors are aware of both course content and teaching techniques should be implemented. Furthermore, tutors should be trained to work with students or selected on the basis of their ability to do so. Students coming in for tutoring have had difficulty in learning and therefore need special care. Having a good knowledge of mathematics is not sufficient for effective tutoring.

4. The poor performance of students who went from Math 56 to Math 1 (Table 7) suggests a need for improvement of instruction and a "tightening up" of grading standards and better evaluation of student readiness for Math 1.

5. While the testing data are encouraging, the early results of remediation indicated in item 4 above are disappointing. Hopefully, modifications made in remedial courses for 1971-72 will yield better results. Furthermore, students in the lower levels of the remedial sequence once they take regular math courses may do better than last year's remedial graduates.

In closing it should be pointed out that the mathematics department has taken on a difficult task. They are attempting in a one and one-half year program to complete what the high school curriculum traditionally accomplishes in three years. This task is further complicated by the large number of students with poor academic records entering the program. Therefore, any success with which the students and the department have met should be welcomed and any failures in these developmental years of the program should be used as indications for program modification and change, and not for any decision making on funding and continuation.

APPENDIX

Mathematics Questionnaire

Below are a series of statements concerning the Math course you are currently taking Please use the following symbols to indicate your degree of agreement with the statement:

SA - strongly agree
A - agree
U - uncertain
D - disagree
SD - strongly disagree

Circle the appropriate response next to each statement below:

1. In comparison to math courses I've taken in high school, I'm learning more in the math courses I'm now taking at CCNY.	SA A U D SD
2. The math course I am taking now is useful for doing work in other courses I am currently taking.	SA A U D SD
3. I expect that the math course I am taking now will be useful in future courses I will take at City College.	SA A U D SD
4. The math course I am taking is important for doing work in my future career.	SA A U D SD
5. Much of the material that is being taught in my math class was covered in my high school math courses.	SA A U D SD
6. In comparison to other courses I am taking at City College I am working harder for the math course I am taking now.	SA A U D SD
7. My current math instructor is a better teacher than most of the math teachers I've had in the past.	SA A U D SD
8. I am certain I will pass the math course I am taking now.	SA A U D SD
9. My math instructor is helpful when I am having difficulty with my work.	SA A U D SD
10. In general the mathematics program (e.g., books, lab, teaching, etc.) is helping me to learn mathematics.	SA A U D SD
11. In the math course I am taking now I am evaluated in a fair and impartial way.	SA A U D SD
12. I am confident I will do well at City College.	SA A U D SD
13. I have heard of the Math Lab.	SA A U D SD
14. I found the Math Lab helpful (answer only if you attended the Math Lab).	SA A U D SD

APPENDIX (Continued)

15. I have heard of the mathematics tutorial program. SA A U D SD

16. I found the mathematics tutorial program helpful. (answer only if you had a math tutor) SA A U D SD

17. I should have been placed in a more advanced math course. SA A U D SD

18. I should have been placed in a less advanced math course. SA A U D SD

SECTION II

19. What did you like most about your math course? _____

_____

20. What did you like least about your math course? _____

_____

21. Please indicate your field of major interest (check only one):

___Antropology
___Architecture
___Art
___Biology
___Chemistry
___Classical Languages & Hebrew
___Computer Science
___Economics
___Education
___Engineering
___English
___Geology
___Germanic and Slavic Languages
___History
___Mathematics
___Music
___Philosophy
___Physical and Health Education
___Physics
___Political Science
___Psychology
___Romance Languages
___Sociology
___Speech and Theatre
___Urban and Ethnic Studies

22. In a few words please indicate what kind of job you wish to have when you finish your education: _____

23. Please write here any suggestions you may have for improving your math course:

_____

_____

_____

24. Please check the math course you are now taking:

___50
___50.1
___50.2
___54
___55
___56

QUESTIONNAIRE FOR INSTRUCTORS OF OPEN ADMISSIONS CLASSES IN MATHEMATICS

Instructor's Name_____

This questionnaire has been prepared by the Division of Evaluation, Research and Testing in cooperation with the Mathematics Department. Its purpose is to assess faculty opinion of the open admission student and the new open admission classes. Data from this questionnaire and other studies will be used to determine the overall effectiveness of open admissions and possible changes for the future.

If you wish to elaborate on any items, please do so on the bottom or back of the questionnaire. Please base your responses on the open admissions class you taught during the fall, 1970 semester. For the first three items please use the following response categories:

SA - strongly agree
A - agree
U - uncertain
D - disagree
SD - strongly disagree

1. The ability level of the students in my open admission course is sufficiently homogeneous so as to permit effective teaching. SA A U D SD

2. The students in my open admissions classes are progressing as rapidly (or more rapidly) as students in regular freshman math classes. SA A U D SD

3. The meetings for teachers of open admissions classes are worthwhile. SA A U D SD

4. Which open admissions math course did you teach this fall?

_____1. 50 _____4. 54

_____2. 50.1 _____5. 55

_____3. 50.2 _____6. 56

5. Approximately what percentage of the students originally enrolled in your open admissions class should have taken a less advenced course?

_____%

6. Approximately what percentage of the students originally enrolled in your open admissions class should have taken a more advanced course?

_____%

7. What do you think should be the proper class size for your course?

_____.

8. In comparison to students in regular freshman math courses, the students in my open admissions courses are: (Please check one.)

_____1. less motivated
_____2. as motivated
_____3. more motivated

9. How much credit do you think students should receive for your course? (Please check one.)

_____1. no credit
_____2. 1 credit
_____3. 2 credits
_____4. 3 credits

10. Do you have any comments concerning the meetings for teachers of open admissions classes?

_____

_____

_____

_____

11. Do you have any comments or suggestions concerning the open admissions math program (e.g., lab, tutoring, syllabus, placement, teaching).

_____

_____

_____

_____

DB:cc
'71