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AUTHOR Belcher, Marcia
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ABSTRACT

A study was conducted at Miami-Dade Community College (MDCC) to determine if there was a relationship between students' performance in a general mathematics course, MGF 1113, and their performance on the College Level Academic Skills Test (CLAST) computation section. The study investigated the relationship between grades in MGF 1113 and CLAST computation performance; the relationship between level of math completed and CLAST performance; the need for students who take higher level mathematics to also take MGF 1113; and the role of workshop review sessions in preparing students for CLAST. The database consisted of all MDCC students who took the CLAST test in either the summer or fall of 1984. Study findings revealed: (1) over 75% of the CLAST test takers enrolled in MGF 1113; (2) 83.6% of the students earning grades of A,B, or C in MGF 1113 passed the CLAST test; (3) passing rates on the CLAST increased with each level of math completed, with 63.6% passing who had taken MAT 003, 87.3% passing who had taken MAT 1024, and 99.8% passing who had taken higher math; (4) there was little difference in student performance on the CLAST test between groups of students who had taken MGF 1113 or higher math; and (5) those students who enrolled in review sessions did not have higher passing rates or significantly higher mean scores than those who did not enroll. Study findings supported the importance of the role of the general mathematics course in the MDCC curriculum. (HB)

THE GENERAL EDUCATION MATHEMATICS CURRICULUM AND THE CLAST

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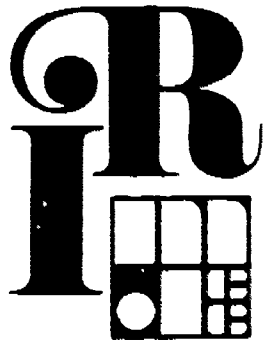

Institutional Research

Miami-Dade Community College

THE GENERAL EDUCATION MATHEMATICS CURRICULUM AND THE CLAST

Research Report No. 85-12

March 1985

Marcia Belcher

Research Associate, Sr.

OFFICE OF INSTITUTIONAL RESEARCH

John Losak, Dean

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The General Education Mathematics Curriculum and the CLAST

In the summer of 1983, "The Final Report of the Committee to Evaluate General Education Mathematics" appeared. The Committee members -- William Palow, Dale Grussing, Robert Blitzer, and Charles Rogers -- agreed to limit their evaluation to MGF 1113. They concluded that: 1) MGF 1113 course competencies differed from campus to campus; 2) performance in MGF 1113 was related to performance on the CLAST Computation test, as evidenced by final grades and final examination scores; 3) students knew more at the end of the course than they did at the beginning; 4) the level of mathematics completed was related to CLAST performance; and 5) review sessions improved CLAST performance on South Campus, though differences in grade point average were also found between those who did and those who did not attend review sessions. At the close of the report, the Committee recommended that all campuses use a multiple-choice common examination similar to the CLAST for a final in MGF 1113 and that the study be replicated using tighter controls.

The purpose of this report is to present the findings of such a replication study urged by the Committee. In some ways, little has changed with the passage of time. Each of the three campuses still has a unique approach to the place of general mathematics (MGF 1113) in preparing students for CLAST. Each has a somewhat different approach to review workshops for CLAST. Each has a different final examination in MGF 1113. Yet, things also must have changed. The foremost evidence is provided by the improvement in CLAST Computation results over the past year. Compared to the 92.3% passing rate for A.A. graduates of one year ago, Fall 1984 candidates had a 98.1% passing rate on the Computation subtest. Results also improved on each campus. On North, the percent passing rose from 92.9% to 97.2%. On South, the improvement was from 95.3% to 98.9%. The Wolfson Campus showed the biggest improvement, moving from 85.5% passing to 97.5% passing.

These statistics indicate that preparation of its student body in mathematics is one area where Miami-Dade has the opportunity to excel. Such

preparation will also be a necessity since the cut score on the Computation test will increase by 15 scaled points in 1986 and by another 20 scaled points in 1989.

This report will attempt to further delineate the role of MGF 1113 in preparing students for CLAST and its place in the mathematics curriculum. The impact of workshops just prior to the test will also be addressed. Specifically, the areas and questions are:

I. What is the relationship between grades in MGF 1113 and CLAST computation performance?

   a. What percentage of students receiving A, B, C, D or F in MGF 1113 on each campus passed the CLAST computation test?

   b. Does the average scaled score vary based on grade received in MGF 1113 and campus where the course was taught?

   c. Does the average number of correct items in each skill area vary based on grade received and campus where the course was taught?

   d. What is the correlation between grades in MGF 1113 and performance in each skill area on the CLAST and with the total score?

II. What is the relationship between level of math completed and CLAST performance?

   a. What proportion pass CLAST who have completed each of seven levels of mathematics?

   b. Does the average scaled score vary based on level of mathematics completed and campus?

   c. Does the average number of correct items in each skill area vary based on level of math completed and campus?

III. Do students who take higher level mathematics also need to take MGF 1113?

   a. What proportion of students pass CLAST who have had (1) neither MGF 1113 or higher math; (2) MGF 1113 only; (3) higher math only; (4) both MGF 1113 and higher math?

b. Does the average scaled score vary based on mathematics courses taken and campus?

c. Does performance on the skill areas vary based on mathematics courses taken and campus?

IV. What is the role of the workshop review sessions in preparing students for CLAST?

a. What proportion of workshop participants pass CLAST compared to nonparticipants?

b. Does the proportion passing vary as a function of level of basic skills, cumulative grade point average, or mathematics courses completed?

c. Does the average scaled score vary as a function of workshop participation and campus when entering level of basic skills and grade point average are held constant across groups?

d. Does performance in the subskill areas vary as a function of workshop participation and campus when entering level of basic skills and grade point average are held constant across groups?

Procedures

The data base consisted of all students who took the CLAST Computation Test in either the summer or the fall of 1984. The one exception to this statement was for question IV concerning workshop participation. In this case, only the fall examinees were included since a roster of workshop participants was available only for the Fall Term. It was assumed that students that were on the roster had also completed the course. In assigning students to level of mathematics completed, a student had to receive an A, B, or a C in order to be credited with satisfactory completion of the course. Students were given credit for having taken higher mathematics if they had a cumulative grade point of 2.0 or better in the following combination of courses: MAC 1114, 1123, 1124, 1132, 1133, 1253, 2154, 2233, 2311, 2411, 2412, MAP 2302, MAS 2103, or MAS 2301. For question III, students also were given credit for having taken higher math for the above reason as well as for satisfactory completion of MAC 1142 or STA 2014.

Most statistical tests were conducted using one of two procedures. Questions on differences in proportion passing were tested using chi square. Questions on mean differences between the groups on CLAST were assessed using analysis of variance. When the question involved differences on the five subskill areas, a multivariate analysis of variance (MANOVA) approach was employed. An alpha level of .05 was used for assessing statistical significance.

Results

Grades in MGF 1113 and CLAST Performance

MGF 1113 is a popular course at Miami-Dade, with over 75% of the CLAST test takers enrolling in it. As shown by Table 1, a large majority of this group received a satisfactory grade in the course, outperforming both those who did not complete the course in a satisfactory manner and students who did not enroll. These differences were significant both college-wide and for each campus.

Not surprisingly, the differences in passing rate also translated into differences in mean scaled scores in Computation. An analysis of variance revealed a significant effect for grade and for campus where the course was taught. A follow-up analysis indicated that the mean score at each grade was significantly different from each other mean score and that campuses also differed significantly from one another. In other words, at each grade level, Wolfson students had lower mean scores than North students and that at each grade level North students also had lower mean scores than South students. In general, A students scored about 20 points higher than B students, while B students scored about 10 points higher than C students (see Table 2).

These differences by grade and by campus persisted in each of the five subskill areas. Again, follow-up tests showed that students at each grade level scored significantly different from students at every other grade level, and that campus location was also a significant independent variable. Table 3 lists the mean results for each subskill area.

Table 1

Grades in MGF 1113 and Passing Rates
on the CLAST Computation Test

	Grades				
	A	B	C	D,F,W,I	No Grade
North Campus					
Number in Group	158	174	204	71	183
Percent of Grades	26.0	28.6	33.6	11.7	-
Number Passing	155	171	191	58	-
Percent Passing	98.1	98.3	93.6	81.7	80.4
South Campus					
Number in Group	211	213	327	188	318
Percent of Grades	20.3	30.1	31.4	18.1	-
Number Passing	206	312	320	173	-
Percent Passing	97.6	99.7	97.9	92.0	90.6
Wolfson Campus					
Number in Group	37	82	74	49	82
Percent of Grades	15.3	33.9	30.6	20.3	-
Number Passing	36	75	65	38	-
Percent Passing	97.3	91.5	87.8	77.6	73.2
College-Wide					
Number in Group	409	576	615	310	619
Percent of Grades	21.4	30.1	32.2	16.2	-
Number Passing	400	563	584	271	522
Percent Passing	97.8	97.7	′5.0	87.4	84.4

Table 2

Average Computation Scaled Score Based on Grades
In MGF 1113 and Course Location

	Grades				
Campus	A	B	C	D,F	Average
North	320.4	300.1	287.5	276.1	299.1
South	330.8	311.8	300.1	289.1	308.9
Wolfson	302.7	289.3	281.5	270.8	286.6
College-Wide	324.0	304.6	293.8	282.9	302.8

Table 3

Average Number of Subtest Items Correct Based On Grade in MGF 1113 and Course Location

Campus	Grades A	B	C	D,F	Average
Arithmetic					
North	8.2	7.3	6.8	6.1	7.2
South	8.5	7.8	7.4	6.9	7.7
Wolfson	7.7	6.7	6.3	5.8	6.6
College-Wide	8.3	7.5	7.1	6.5	7.4
Algebra					
North	9.9	8.7	7.8	6.5	8.5
South	10.8	9.7	8.8	8.1	9.4
Wolfson	9.2	8.0	7.5	6.0	7.7
College-Wide	10.3	9.1	8.3	7.4	8.9
Geometry and Measurement					
North	8.0	6.7	5.6	5.0	6.5
South	8.3	7.3	6.4	5.3	7.0
Wolfson	6.6	5.5	4.9	4.1	5.3
College-Wide	8.0	6.8	6.0	5.1	6.6
Logical Reasoning					
North	9.8	8.6	7.4	6.6	8.3
South	10.6	9.4	8.9	8.0	9.3
Wolfson	8.4	7.3	7.0	6.8	7.3
College-Wide	10.1	8.8	8.2	7.5	8.7
Statistics and Probability					
North	7.3	6.4	5.7	4.9	6.3
South	7.7	7.2	6.3	5.6	6.8
Wolfson	6.7	5.9	5.4	4.5	5.7
College-Wide	7.5	6.7	6.0	5.2	6.5

The strength and linearity of the relationship between CLAST performance and MGF 1113 grades are best shown by means of a correlation between the two. As shown by Table 4, on a college-wide basis the strongest relationship between grades and subskill performance was in Geometry and Measurement and in Probability and Statistics. Some definite differences between the campuses appeared, with the Wolfson Campus showing a particularly weak relationship between grades in MGF 1113 and performance in the logical reasoning portion of the CLAST. All of the correlations shown in the table, however, were significantly different from zero at the .001 level of significance.

Level of Math and CLAST Performance

In general, both passing rates and mean scores indicated that the more math completed, the better the performance on CLAST. Passing rates steadily increased with each level of math completed (see Table 5). The one exception to this statement was that students who completed no math at Miami-Dade outperformed students who completed only MAT 0003. This was probably due both to the fact that those who completed MAT 0003 entered Miami-Dade in need of developmental help in Computation while those assigned to the "no math" category may have completed some mathematics at other institutions.

Significant differences in the mean scaled scores were found both for level of math completed ($F = 99.9$, $p < .0001$) and for home campus ($F = 46.0$, $p < .0001$). Follow-up comparisons of the group means indicated that the only place that significant differences were not found was between the group that had no math and the group that completed only the developmental course MAT 0003, and between those that had no math at Miami-Dade and those that completed MAT 1024. In addition, significant differences were found among the campus locations. This indicated that those who completed MGF 1113, for example, on South Campus had significantly higher scores than those who completed MGF 1113 on North, while North Campus students scored significantly higher than Wolfson students. See Table 6 for full results.

Table 4

Correlation Between Grade in MGF 1113 and Performance
On the CLAST Computation Topics

	Campus			
	North	South	Wolfson	College-Wide
Arithmetic	.34	.32	.25	.30
Algebra	.39	.39	.33	.36
Geometry and Measurement	.45	.44	.25	.41
Logical Reasoning	.43	.37	.17	.34
Statistics and Probability	.42	.40	.30	.38
Total Score	.51	.49	.36	.37
Number in Group	631	1,038	240	2,523

Table 5

Proportion Passing the CLAST Computation Test Based
On Level of Math Completed and Campus

	Campus							
	North		South		Wolfson		College-Wide	
	N	%	N	%	N	%	N	%
No Math	34	59.7	83	82.2	24	64.9	141	72.3
MAT 0003	17	53.1	34	75.6	5	45.5	56	63.6
MAT 1024	48	87.3	88	90.7	28	77.8	164	87.3
MAC 1102	43	93.5	106	95.5	13	72.2	162	92.6
MGF 1113	349	95.1	582	98.0	124	89.2	1,055	95.9
STA 2014/MAC 1142	97	98.0	163	99.4	26	96.3	286	98.6
Higher Math*	134	100.0	241	100.0	53	98.2	428	99.8

*Includes MAC 1114, 1123, 1124, 1132, 1133, 1553, 2154, 2233, 2311, 2411
2412; MAP 2302; MAS 2103 or MAS 2301.

Table 6

Average Computation Scaled Score and Number in Group
Based on Level of Math Completed and Campus

	Campus							
	North		South		Wolfson		College-Wide	
	Mean	N	Mean	N	Mean	N	Mean	N
No Math	265.3	57	284.0	101	273.4	37	276.5	195
MAT 0003	258.7	32	272.4	45	257.5	11	265.5	88
MAT 1024	278.5	55	286.7	97	271.9	36	281.5	188
MAC 1102	289.7	46	294.3	111	280.2	18	291.6	175
MGF 1113	295.4	367	305.1	594	283.9	139	299.2	1,100
STA 2014/MAC 1142	304.6	99	315.0	164	295.9	27	309.7	290
Higher Math*	320.9	134	327.2	241	307.1	54	322.7	429

*Includes MAC 1114, 1123, 1124, 1132, 1133, 1553, 2154, 2233, 2311, 2314,
2412; MAP 2302; MAS 2103 or MAS 2301.

Further analysis of the subtest performance indicated that findings on the relationship of subtest performance to level of math completed varied depending upon the campus. Therefore, subtest results will be discussed separately for each campus. On North Campus, significant differences between the groups were found in each of the five skill areas. Most of these differences were between those who had completed higher mathematics and every other group. No differences were found between those who completed MAT 1024, MAT 0003, and those who had taken no math at Miami-Dade. Nor were any differences found between those who completed MGF 1113 and those who completed MAC 1102. See the first column of Table 7 for the average number of items each group correctly answered in each subskill area. See Table 8a for a summary of which group comparisons were significant.

On South Campus, again most differences focused on those who completed a higher level math compared to all other groups. No differences were found between those who completed MAT 1024, MAT 0003 and no math at Miami-Dade except in the area of arithmetic, where those who completed MAT 1024 performed significantly better than either of the other two groups. Unlike North Campus, MGF 1113 students on South performed significantly better than MAC 1102 students in all areas except Algebra. See Table 7 and Table 8b for further details.

On Wolfson Campus, follow-up of significant mean differences between the groups resulted in fewer significant comparisons (see Table 8a). This was probably due to the smaller numbers on this campus as well as the different pattern of curricular offerings. In most instances, those that had higher math, STA 2014, or MAC 1142 performed significantly better than the groups that had MAT 1024, MAT 0003, or no math at Miami-Dade. Students who took MGF 1113 did not score significantly higher than any other group except in the area of statistics and probability were they scored higher than MAT 0003 students only. Particularly disconcerting was the lack of differences between the groups on logical reasoning, where the only significant difference was between those who had some of the highest math courses and those who had no math or MAT 0003. This may indicate either

Table 7

Average Number of Subtest Items Correct Based on Level of Math Completed and Campus

	Campus		
	North	South	Wolfson
Arithmetic			
No Math	4.9	6.1	5.6
MAT 0003	4.6	5.8	4.9
MAT 1024	6.3	7.1	5.9
MAC 1102	7.0	6.9	6.2
MGF 1113	7.1	7.6	6.4
STA 2014/MAC 1142	7.6	8.1	7.0
Higher Math*	8.1	8.3	7.9
Algebra			
No Math	5.4	7.4	6.3
MAT 0003	4.9	6.2	4.9
MAT 1024	6.6	7.5	6.1
MAC 1102	8.1	8.5	7.6
MGF 1113	8.2	9.1	7.3
STA 2014/MAC 1142	9.3	10.1	9.4
Higher Math*	10.7	11.1	10.4
Geometry and Measurement			
No Math	4.3	5.1	5.0
MAT 0003	4.1	4.4	3.7
MAT 1024	5.0	5.1	3.9
MAC 1102	6.0	6.0	5.3
MGF 1113	6.3	6.7	5.1
STA 2014/MAC 1142	7.0	7.4	5.5
Higher Math*	8.0	8.3	7.1
Logical Reasoning			
No Math	5.9	7.6	6.2
MAT 0003	5.2	6.7	4.8
MAT 1024	6.9	7.8	7.2
MAC 1102	7.3	8.4	6.6
MGF 1113	8.3	9.2	7.2
STA 2014/MAC 1142	8.5	9.4	8.1
Higher Math*	9.2	9.9	8.0
Statistics and Probability			
No Math	4.5	5.4	4.6
MAT 0003	3.8	4.6	3.2
MAT 1024	5.1	5.6	4.4
MAC 1102	5.7	5.8	4.9
MGF 1113	6.1	6.7	5.5
STA 2014/MAC 1142	6.7	7.2	6.3
Higher Math*	7.2	7.5	6.6

*Includes MAC 1114, 1123, 1124, 1132, 1133, 1553, 2154, 2233, 2311, 2314, 2412; MAP 2302; MAS 2103 or MAS 2301.

Table 8a.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are Ordered From High to Low. A ** Indicates the Mean on Left is Significantly Higher

NORTH CAMPUS

	STA 2014/MAC 1142	MFG 1113	MAC 1102	MAT 1024	No Math	MAT 0003
Arithmetic						
Higher Math		**		**	**	**
STA 2014/MAC 1142						
MGF 1113						
MAC 1102						
MAT 1024						
No Math						
MAT 0003						
Algebra						
Higher Math	**	**	*	**	**	**
STA 2014/MAC 1142		**		**	**	**
MGF 1113				**	**	**
MAC 1102					**	**
MAT 1024						
No Math						
MAT 0003						
Geometry & Measurement						
Higher Math	**	**	**	**	**	**
STA 2014/MAC 1142				**	**	**
MGF 1113				**	**	**
MAC 1102					**	**
MAT 1024						
No Math						
MAT 0003						
Logical Reasoning						
Higher Math		**	**	**	**	**
STA 2014/MAC 1142				**	**	**
MGF 1113				**	**	**
MAC 1102						**
MAT 1024						
No Math						
MAT 0003						
Statistics and Probability						
Higher Math		**	**	**	**	**
STA 2014/MAC 1142				**	**	**
MGF 1113					**	**
MAC 1102						**
MAT 1024						
No Math						
MAT 0003						

Table 8b.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are Ordered From High to Low. A ** Indicates the Mean on Left is Significantly Higher

SOUTH CAMPUS

Arithmetic

	STA 2014/MAC 1142	MGF 1113	MAT 1024	MAC 1102	No Math	Mat 0003
Higher Math		**	**	**	**	**
STA 2014/MAC 1142			**	**	**	**
MGF 1113				**	**	**
MAT 1024					**	**
MAC 1102						**
No Math						
MAT 0003						

Algebra

	STA 2014/MAC 1142	MGF 1113	MAC 1102	MAT 1024	No Math	MAT 0003
Higher Math	**	**	**	**	**	**
STA 2014/MAC 1142		**	**	**	**	**
MGF 1113				**	**	**
MAC 1102						**
MAT 1024						
No Math						
MAT 0003						

Geometry & Measurement

	STA 2014/MAC 1142	MGF 1113	MAC 1102	No Math	MAT 1024	MAT 0003
Higher Math	**	**	**	**	**	**
STA 2014/MAC 1142		**	**	**	**	**
MGF 1113			**	**	**	**
MAC 1102					**	**
No Math						
MAT 1024						
MAT 0003						

Logical Reasoning

	STA 2014/MAC 1142	MGF 1113	MAC 1102	MAT 1024	No Math	MAT 0003
Higher Math		**	**	**	**	**
STA 2014/MAC 1142			**	**	**	**
MGF 1113			**	**	**	**
MAC 1102						**
MAT 1024						
No Math						
MAT 0003						

Statistics and Probability

	STA 2014/MAC 1142	MGF 1113	MAC 1102	MAT 1024	No Math	MAT 0003
Higher Math		**	**	**	**	**
STA 2014/MAC 1142			**	**	**	**
MGF 1113			**	**	**	**
MAC 1102						**
MAT 1024						
No Math						
MAT 0003						

Table 8c.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are Ordered From High to Low. A ** Indicates the Mean on Left is Significantly Higher

WOLFSON CAMPUS

Arithmetic

	STA 2014/MAC 1142	MGF 1113	MAC 1102	MAT 1024	No Math	MAT 0003
Higher Math		**		**	**	**
STA 2014/MAC 1142						
MGF 1113						
MAC 1102						
MAT 1024						
No Math						
MAT 0003						

Algebra

	STA 2014/MAC 1142	MAC 1102	MGF 1113	No Math	MAT 1024	MAT 0003
Higher Math		**	**	**	**	**
STA 2014/MAC 1142			**	**	**	**
MAC 1102						
MGF 1113						
No Math						
MAT 1024						
MAT 0003						

Geometry & Measurement

	STA 2014/MAC 1142	MAC 1102	MGF 1113	No Math	MAT 1024	MAT 0003
Higher Math			**	**	**	**
STA 2014/MAC 1142						
MAC 1102						
MGF 1113						
No Math						
MAT 1024						
MAT 0003						

Logical Reasoning

	Higher Math	MGF 1113	MAT 1024	MAC 1102	No Math	MAT 0003
STA 2014/MAC 1142						**
Higher Math					**	**
MGF 1113						
MAT 1024						
MAC 1102						
No Math						
MAT 0003						

Statistics and Probability

	STA 2014/MAC 1142	MGF 1113	MAC 1102	No Math	MAT 1024	MAT 0003
Higher Math				**	**	**
STA 2014/MAC 1142				**	**	**
MGF 1113						**
MAC 1102						
No Math						
MAT 1024						
MAT 0003						

that logical reasoning is taught all along the way so that no differences occur or that it is not taught at all.

Necessity of Higher Level Math and MGF 1113

This section analyzed course offerings and CLAST performance in a slightly different way. In the previous section, students who were assigned to the higher math group, for example, could also have taken MGF 1113 but because that was the highest level of math completed, that was their group assignment. In this section, students were reassigned to one of four categories. The group who took neither MGF 1113 nor higher math consisted of the former groups who had no math, MAT 0003, MAT 1024, or MAT 1102. A second group of students consisted of those who had MGF 1113 but no higher math. This was also the same group formed previously. A third group was formed of students who had MAC 1142 or STA 2014 as well as the courses previously defined as higher mathematics courses; this group did not take MGF 1113. The fourth group included students who completed both MGF 1113 and one or more of the higher math courses.

As shown by Table 9, the proportion passing the test changed very little among the three groups that had MGF 1113 or higher math. The basic difference was between those students that had neither type of course and all other groups. Only on the Wolfson Campus did it appear that completion of a higher mathematics course boosted the passing rate over completion of MGF 1113 alone.

Using mean scaled scores to compare groups and campuses resulted in finer discriminations. An analysis of variance indicated there were significant mean differences both among the groups ($F = 162.4$, $p < .0001$) and among campuses ($F = 40.8$, $p < .0001$). Among the groups, those that had only higher math scored no differently on the CLAST than those that had both. Both of these groups scored higher than those that had MGF 1113 alone, while this group scored higher than those who had neither. Table 10 contains the mean results for each group and campus.

Table 9

Proportion Passing the CLAST Computation Test Based on Completion of MGF 1113 and/or Higher Level Math by Campus

	Campus							
	North		South		Wolfson		College-Wide	
	N	%	N	%	N	%	N	%
Neither	142	74.7	311	87.9	70	68.6	523	82.0
MGF 1113 Only	349	95.1	582	98.0	124	89.2	1,055	95.9
Higher Math Only*	39	100.0	89	100.0	16	100.0	144	100.0
Both	192	99.0	315	99.7	63	96.9	570	99.1

*Includes MAC 1142, STA 2014, and well as previously defined higher mathematics courses.

Table 10

Average Computation Scaled Score and Number in Group Based on Completion of MGF 1113 and Higher Level Math

	Campus							
	North		South		Wolfson		College-Wide	
	Mean	N	Mean	N	Mean	N	Mean	N
Neither	273.9	190	286.5	354	272.3	102	280.6	646
MGF 1113 Only	295.4	367	305.1	594	283.9	139	299.2	1,100
Higher Math Only*	313.4	39	319.3	89	309.0	16	316.6	144
Both	314.1	194	323.1	316	302.0	65	317.6	575

*Includes MAC 1142, STA 2014, and well as previously defined higher mathematics courses.

Analysis of each of the skill areas to assess where these differences were occurring resulted in the finding that there were significant differences in each area but that interpretation again needed to be on a campus-by-campus basis (see Table 11). On North Campus, no differences were found in any area between those that had higher math only and those that had higher math and MGF 1113. Both of these groups, however, performed significantly better than the MGF 1113 only group in most areas. In the areas of logical reasoning and statistics and probability, those with only higher math performed no differently than those with MGF 1113 only. The fact that MGF 1113 was an important component of the program is shown by the superior performance of this group over those that had neither MGF 1113 nor higher math in all five areas. See Table 12a for the significant comparisons among the groups.

On South Campus, those that had only higher level mathematics outperformed those that had completed only MGF 1113 in only two areas: Algebra, and Geometry and Measurement. In the remaining three areas, those that had taken higher mathematics instead of MGF 1113 performed no differently than those enrolled in MGF 1113 only. Those that took neither MGF 1113 nor higher mathematics performed significantly worse than any of the other groups in all five areas. Again, the group with higher math and MGF 1113 performed no differently than the group with only higher math. See Table 12b as well as Table 11 for details.

On Wolfson Campus, those with higher math only and those with both again performed similarly. Students with higher math only and no course work in MGF 1113 performed the same as MGF 1113 students in the areas of arithmetic, logical reasoning, and statistics and probability. MGF 1113 students, however, outperformed students that had enrolled in neither type of course only in the area of statistics and probability; in the other four areas, there were no differences in mean scores between the two groups. Note in Table 12c that in the area of logical reasoning the only significant difference which appeared was between those students who had taken both MGF 1113 and higher math and those students who that had neither.

Table 11

Average Number of Subtest Items Correct Based on Completion of MGF 1113 and/or Higher Math by Campus

	Campus		
	North	South	Wolfson
Arithmetic			
Neither	5.8	6.6	5.7
MGF 1113 Only	7.1	7.6	6.4
Higher Math Only	8.0	7.8	7.9
Both	7.9	8.3	7.5
Algebra			
Neither	6.3	7.6	6.3
MGF 1113 Only	8.2	9.1	7.3
Higher Math Only	10.4	10.8	10.5
Both	10.0	10.7	9.9
Geometry and Measurement			
Neither	4.9	5.3	4.5
MGF 1113 Only	6.3	6.7	5.1
Higher Math Only	7.7	7.8	7.5
Both	7.6	8.0	6.3
Logical Reasoning			
Neither	6.4	7.8	6.5
MGF 1113 Only	8.3	9.2	7.2
Higher Math Only	8.6	9.3	8.1
Both	9.0	9.8	8.1
Statistics and Probability			
Neither	4.9	5.5	4.5
MGF 1113 Only	6.1	6.7	5.5
Higher Math Only	6.8	7.2	6.1
Both	7.0	7.4	6.6

Table 12a.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are ordered from High to Low. A ** Indicates the Mean on Left is Significantly Higher

NORTH CAMPUS

	Both	MGF 1113 Only	Neither
Arithmetic			
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			**
Neither			
Algebra			
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			**
Neither			
Geometry and Measurement			
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			**
Neither			

	Higher Math Only	MGF 1113 Only	Neither
Logical Reasoning			
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			
Statistics and Probability			
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			

Table 12b.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are Ordered From High to Low. A ** Indicate the Mean on Left is Significantly Higher

SOUTH CAMPUS

Arithmetic			
	Higher Math Only	MGF 1113 Only	Neither
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			

Algebra			
	Both	MGF 1113 Only	Neither
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			**
Neither			

Geometry and Measurement			
	Higher Math Only	MGF 1113 Only	Neither
Both		**	**
Higher Math Only		**	**
MGF 1113 Only			**
Neither			

Logical Reasoning			
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			

Statistics and Probability			
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			

Table 12c.

Group Comparisons Which Were Significant Using Scheffe's Test
And a Confidence Level of .95

Note: Group Means are ordered from High to Low. A ** Indicates the Mean on Left is Significantly Higher

WOLFSON CAMPUS

	Both	MGF 1113 Only	Neither
Arithmetic			
Higher Math Only			**
Both		**	**
MGF 1113 Only			
Neither			
Algebra			
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			**
Neither			
Geometry and Measurement			
Higher Math Only		**	**
Both		**	**
MGF 1113 Only			
Neither			
Logical Reasoning			
Higher Math Only			**
Both			
MGF 1113 Only			
Neither			
	Higher Math Only	**MGF 1113 Only**	**Neither**
Statistics and Probability			
Both		**	**
Higher Math Only			**
MGF 1113 Only			**
Neither			

Review Sessions and CLAST

If in no other way, the campuses differed in the percentages of their students taking the Fall 1984 CLAST who also enrolled in review sessions. On North Campus only 43% of the test takers signed up for the math review. On South Campus, 60% took the review sessions, while on Wolfson 80% of the fall examinees also signed up for the review.

In most ways, the differences end there. Those that enrolled in the review sessions did not have higher passing rates or significantly higher mean scores (see Table 13). Analysis of passing rates based on CGP quartile, grade point average, and completion of MGF 1113 and/or higher math also revealed few differences between the groups.

Assuming that those students who entered Miami-Dade low in basic mathematics skills might benefit from the workshops more than those students who were already proficient, the proportion of workshop participants passing CLAST was compared to non-participants at each quartile of the CGP mathematics test. Collegewide, no significant differences were found. When sufficient numbers of students were involved so that statistical tests could be performed for each campus, no significant differences again were found.

The same procedure was used and the results were found when cumulative grade point average was considered (see Table 15). The one point where it appeared that the workshop might have been helpful -- for Wolfson students with GPAs below 2.5 -- no statistical tests could be performed because of the small number of non-enrollees in the group.

In one area, workshop participation seemed to make a difference. That was for students who had neither MGF 1113 nor higher mathematics. For this group, comparison of the passing rates collegewide resulted in significance. Table 16 lists the full results.

Comparison of mean scores after holding constant the effects of grade point average and CGP scores using analysis of covariance yielded no new insights. Holding grade point average constant still resulted in no significant differences between the groups on workshop performance, even after level of mathematics completed was also considered. The effects of the workshop on mean scores after holding CGP scores constant could not be studied because of violations to the assumptions of analysis of covariance.

Table 13

Percent Passing and Average Scaled Score for CLAST Computation Based on Workshop Enrollment and Campus

	Campus							
	North		South		Wolfson		College-Wide	
	Not Enroll	Enroll	Not Enroll	Enroll	Not Enroll	Enroll	Not Enroll	Enroll
Mean	303.1	307.5	314.2	314.4	291.8	298.5	307.6	308.9
Percent Passing	95.0	97.4	98.7	99.2	92.5	98.8	96.7	98.7
Number in Group	201	152	239	352	40	163	481	667

Table 14

Proportion Passing the Computation Test Based on Enrollment in a Non-Credit Workshop Controlling For Entering Level of Basic Skills

	Campus							
	North		South		Wolfson		College-Wide	
	N	%	N	%	N	%	N	%
Bottom Quartile								
Not Enrolled	14	93.3	13	86.7	4	80.0	32	88.9
Enrolled	16	88.9	35	97.2	22	95.7	73	94.8
Second Quartile								
Not Enrolled	20	95.2	27	96.4	2	50.0	49	92.5
Enrolled	23	100.0	61	96.8	26	100.0	110	98.2
Third Quartile								
Not Enrolled	47	94.0	49	100.0	9	100.0	105	97.2
Enrolled	34	100.0	73	100.0	46	100.0	153	100.0
Top Quartile								
Not Enrolled	59	98.3	100	100.0	14	100.0	173	99.4
Enrolled	50	100.0	135	100.0	39	100.0	224	100.0
No Scores								
Not Enrolled	51	92.7	47	100.0	8	100.0	106	96.4
Enrolled	25	92.6	45	100.0	28	96.6	98	97.0

Table 15

Proportion Passing the Computation Test Based on Enrollment in a Non-Credit Workshop Controlling for Cumulative Grade Point Average

	Campus							
	North		South		Wolfson		College-Wide	
	N	%	N	%	N	%	N	%
GPA Less Than 2.5								
Not Enrolled	52	89.7	79	96.3	9	75.0	141	92.2
Enrolled	33	94.3	92	96.8	34	97.1	159	96.4
GPA 2.5 - 2.99								
Not Enrolled	60	95.2	75	100.0	8	100.0	143	98.0
Enrolled	41	95.4	124	100.0	58	98.3	223	98.7
CGP 3.0 - 3.49								
Not Enrolled	60	98.4	53	100.0	14	100.0	127	99.2
Enrolled	44	100.0	96	100.0	48	100.0	188	100.0
Not Enrolled	19	100.0	29	100.0	6	100.0	54	100.0
Enrolled	30	100.0	37	100.0	21	100.0	88	100.0

Table 16

Proportion Passing the Computation Test Based on Enrollment in a Non-Credit Workshop and Controlling for Completed Math Courses

	Campus							
	North		South		Wolfson		College-Wide	
	N	%	N	%	N	%	N	%
Neither MGF 1113 Nor Higher Math								
Not Enrolled	32	78.1	57	96.6	11	84.6	101	88.6
Enrolled	22	95.7	93	96.9	28	93.3	143	96.0
MGF 1113 Only								
Not Enrolled	90	100.0	90	98.9	20	95.2	200	99.0
Enrolled	71	97.3	156	100.0	75	100.0	302	99.3
Higher Math Only								
Not Enrolled	9	100.0	23	100.0	2	100.0	34	100.0
Enrolled	10	100.0	22	100.0	9	100.0	41	100.0
Both								
Not Enrolled	60	98.4	66	100.0	4	100.0	130	99.2
Enrolled	45	97.8	78	100.0	49	100.0	172	99.4

Discussion

In most ways, results of this study confirmed those found and presented in the final report by the Committee to Study General Mathematics. Then as now, grades in MGF 1113 were a good indicator of CLAST performance. Generally, we could expect "A" students to perform better than "B" students and "B" students to outperform "C" students. Still, independently of the grades received, South Campus students performed better than North Campus students, and North Campus outperformed the Wolfson Campus. In all cases, however, successful completion of MGF 1113 improved changes of passing CLAST.

Results further indicated that course work beyond MGF 1113 improved passing rates and average scores on CLAST. Again, students with the same pattern of course offerings on their transcripts performed best on South, followed by North, then Wolfson students. The reasons for these differences, however, varied by campus. On North, those with higher mathematics outperformed everyone else while students with MGF 1113 credit differed not at all from students who had MAC 1102 instead. On South, however, MGF 1113 students performed better than MAC 1102 students, though higher mathematics students still scored higher in most areas. On Wolfson, the level of math completed made very little difference except in comparing the very highest level students with the very lowest. MGF 1113 students did not seem to have a definitive edge over any other group in almost all skill areas.

Further analysis of the necessity of MGF 1113 for students who successful completed higher level math indicated that MGF 1113 was probably not necessary for these students. Passing rates and mean scores varied by insignificant amounts for the the two groups with higher math, and students with higher math instead of MGF 1113 had higher mean scores collegewide. Analysis of subskill performance further reinforced this finding, except on Wolfson where it appeared that students needed both higher level math and MGF 1113 to improve their performance. It is likely that this is due to the curricular pattern on Wolfson Campus and not the English skills that Wolfson students may or may not possess.

Review sessions did not improve students' performance except for the group who had completed neither MGF 1113 nor higher level math. This finding contradicted earlier studies. One by Blitzer and Steed found that

South Campus students enrolled in MFG 1113 improved their performance by enrolling in the workshop. The 1983 final report had also tentatively suggested that there was value to the review sessions. One possible explanation is that with the passage of time, the regular curriculum has improved in preparing students for CLAST so the workshop has become more of a backup mechanism of value to fewer students.

The place of general mathematics in the total math curriculum seems to be, with few exceptions, both clear and strong. For the student not interested in additional mathematics courses, MGF 1113 offers a good preparation for the CLAST. For the student of the mathematics, however, it appears generally superfluous. In either case, the curriculum appears to be such that M-DCC is ready to "challenge the CLAST" in mathematics and could be a strong performer in this subject area statewide.