

An Analysis of The General College Placement Tests

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Introduction

Since 1979, the General College has administered tests in reading, writing and mathematics to use in placing students into appropriate developmental skills courses. In 1981 and 1985 norms were produced for placement tests used in the General College (Brothen, T., Romano, J., Robertson, D., and Garfield, J., 1981; Garfield, J. and Razzaque, M., 1985). The tests described in those reports were a combination of national standardized tests and a locally developed instrument. Local percentile ranks developed for the college were used to compare General College students with a national norm group on the standardized tests.

As of Fall, 1986, new tests for reading and mathematics were selected for placing entering students. The new tests were part of the Multiple Assessment Programs and Service (MAPS) distributed by the College Entrance Examination Board (CEEB). A decision was made to continue using the same writing test which was part of the MAPS comparative Guidance and Placement Program. A faculty task group was appointed to select a specific tests and to develop placement criteria for them. The tests chosen were all part of the Descriptive Test Series.

"Reading Comprehension" was one of five tests in the Descriptive Tests of Language skills (CEEB, 1983). Arithmetic skills and Elementary Algebra Skills were two of four tests in the Descriptive Tests of Mathematics Skills (CEEB, 1985). This paper presents an analysis of data gathered on over 900 students who entered General College in Fall, 1986, and who took the college placement tests.

Method

Following the procedure specified by Brown (1976), frequency distributions were generated for the four tests which were used in calculating mid-point percentile ranks.

Means and standard deviations for all tests were also calculated. These data are displayed in Tables 1 through 4. For the reading and mathematics tests, scaled scores were used in computing national norms. These allow for comparisons between tests and are included in the tables.

Next, students were classified according to level of prescribed skills courses in each subject area (Table 5) and in combinations of areas (Table 6).

First-year academic outcomes were then compared for students in the different placement categories, as shown in Table 7.

Finally, correlations were calculated between the four placement scores, and between placement scores and first-year academic outcomes. These results are shown in Table 8.

Results

Results are presented separately for each test followed by a general analysis of the tests.

Reading Comprehension

The mean score achieved by General College students in reading comprehension was almost identical to the national mean. A comparison of national and local percentile ranks shows that fewer GC students scored in the higher ranges of the test. But students with raw scores between 30 to 34 have more similar national and local percentile ranks. Looking at the breakdown of recommended courses, more students (42%) tended to be placed in the second level (1401, 1403, or 1407) than any other level. Only 13% of the students received scores which would not place them in a developmental reading course.

Written English Expression

National and local percentile ranks were fairly close for this test. The main difference again was that fewer high scores were present in the GC group. A national mean was not available for comparison. A majority of new students (84%) received scores indicating the need for a writing course prior to the college level writing sequence.

Mathematics Tests

There was a greater disparity between scores achieved by GC students on the "Arithmetic Skills Test" and the national norm group scores. The GC group scored higher than the norm group. One-half of GC students scored above a 28, while only one-fourth of the control group scored in that range. The mean for GC was about 4 points higher than the national mean. This is probably due to the fact that students in the national group were selected only if they had not taken college courses in algebra and no selection criteria was used for GC students.

On the "Elementary Algebra Skills" test, results were more comparable for students with raw scores above 22. Fewer GC students received low scores when compared to the norm group. The GC mean was again higher than the norm group, probably because the GC students taking the test had taken 1 or 2 semesters of algebra.

Most students (79%) had scores that placed them into one of four decision zones which required students to judge which course was more appropriate. Few students placed into clear-cut categories for arithmetic, elementary algebra, and intermediate algebra.

Overall Description of Student Scores

Forty-two percent of the entering students needed to take developmental skills courses in reading, writing, and mathematics. (If students needing intermediate algebra were included, this percentage would be even higher). Only 7% of the new students did not need to take any developmental skills courses.

When first-year academic outcomes were compared for students in different placement categories, it appeared that students needing coursework in all three areas had the lowest mean cumulative GPA and mean CCR after one year. There was almost no difference in mean GPAs and CCRs for students needing two, one, or no skills courses.

These results may be due to one or more of the following reasons:

- a) Students who enter with low placement scores in all skill areas may have deficiencies that decrease their performance in other classes, whether or not remedial coursework is taken. [This reason has been documented by Morris and Losak (1986)].
- b) Students who did take the recommended coursework may have done better than students who had not taken the recommended classes. These results may be masked when all students are combined together.
- c) Unless students remediate all skill areas right away, their performance in other courses is jeopardized.

Unfortunately a comparison of students who took recommended courses with those who did not was not possible as part of this study, due to lack of individual course records on the student data base.

Correlations Involving Placement Tests

An intercorrelation of placement scores indicated high significant (but not surprising) correlations between reading and writing (0.62) and between arithmetic and algebra (.65).

When correlations were calculated between placement scores and first-year academic outcomes, the results were also not surprising. Significant but very small correlations were found between only the mathematics test and credits completed and grades.

Because the placement tests are designed for diagnostic purposes, we did not expect them to correlate with first-year grades. Rather, a lack of correlation would imply that students were being placed appropriately, and by making up skill deficiencies, were more similar in academic achievement.

Recommendations

Because so many GC students placed into one category (Level 2) of both the Reading and Writing Tests, different placement criteria or different instruments with better discrimination of students at that level may be needed.

Another concern is that so many students placed in "decision zones" for the mathematics courses. It would be useful to know which courses those students selected and how they did so that placement guidelines may be adjusted.

Given the high percentage of students who needed coursework in all skill areas, and given the lower mean GPA for these students, we recommend a study which looks at

which courses these students actually take and when they take them. Then students' academic performance may be compared among students with different course selection patterns.

Table 1

**Local and National Percentile Ranks for
"Reading Comprehension"**

Raw Score	Scaled Score	National Percentile*	General College Percentile
45	25	99 ⁺	99 ⁺
44	24	98	99 ⁺
43	24	98	99
42	23	95	98
41	22	91	96
40	21	83	93
39	21	83	89
38	20	74	84
37	19	74	80
36	19	66	74
35	18	58	66
34	17	53	59
35	16	47	52
32	16	47	46
31	15	41	40
30	14.5	36	35
29	14	36	30
28	13	31	26

Table 1 (cont.)

**Local and National Percentile Ranks for
"Reading Comprehension"**

Raw Score	Scaled Score	National Percentile*	General College Percentile
27	12	29	23
26	11	25	20
25	11	25	18
24	10	22	15
23	9	19	13
22	9	19	12
21	8	16	10
20	7	13	9
19	7	13	8
18	6	10	8
17	5	9	7
16	4	7	7
15	4	7	6
14	3	5	5
13	2	3	4
12	2	3	4
11	1	1	3
10	1	1	2

Table 1 (cont.)

**Local and National Percentile Ranks for
"Reading Comprehension"**

Raw Score	Scaled Score	National Percentile*	General College Percentile
9	1	1	2
8	1	1	1
7	1	1	1
6	1	1	1
5	1	1	1
4	1	1	1
3	1	1	1
2	1	1	1
1	1	1	1

Raw Score GC Mean = 31.07

Raw Score GC Std Dev = 7.73

National Mean = 15.2 (scale score)

National Mean \approx 31 (raw score)

* Data were gathered from 2,240 students from 15 two-year and four-year colleges

Table 2

"Written English Expression"

Raw Score	National Percentile*	General college Percentile
40	99	99 ⁺
39	99	99
38	99	99
39	97	99
36	95	99
35	92	98
34	89	97
33	85	94
32	81	90
31	76	86
30	72	80
29	67	74
28	61	67
27	56	59
26	51	51
25	45	45
24	40	37
23	35	31
22	30	26
21	26	22
20	22	18
19	18	14
	10	

Table 2 (cont.)
"Written English Expression"

Raw Score	National Percentile*	General College Percentile
18	15	11
17	12	9
16	9	7
15	7	5
14	5	5
13	4	3
12	3	2
11	2	1
10	1	1
9	1	1
8	1	1
7	1	1
6	1	1
5	1	1
4	1	1
3	1	1
2	1	1
1	1	1

Mean = 25.14
 Std Dev = 5.65

* Norms were obtained from Garfield and Razzaque (1985)

Table 3

"Arithmetic Skills Test"

Raw Score	Scaled Score	National Percentile*	General College Percentile
35	25	99	99
34	24	98	95
33	23	96	89
32	22	93	83
31	21	90	77
30	20	84	70
29	20	84	63
28	19	79	56
27	18	75	50
26	17	70	43
25	16	65	37
24	15	61	32
23	14	56	27
22	13	51	22
21	12	47	18
20	11	42	14
19	10	37	12
18	9	29	9
17	9	29	7
16	8	22	5

Table 3 (cont.)

"Arithmetic Skills Test"

Raw Score	Scaled Score	National Percentile*	General College Percentile
15	7	17	4
14	6	13	3
13	5	9	2
12	4	6	2
11	3	4	1
10	2	2	1
9	1	1	1
8	1	1	1
7	1	1	1
6	1	1	1
5	1	1	1
4	1	1	1
3	1	1	1
2	1	1	1
1	1	1	1

Raw Score GC Mean = 26.24

Raw Score GC Std Dev = 5.69

National Mean = 13.04 (scaled score)

National Mean \approx 22 (raw score)

* Data were gathered from 965 college students who had no coursework in algebra

Table 4

"Elementary Algebra Skills"

Raw Score	Scaled Score	National Percentile*	General College Percentile
35	25	99 ⁺	99 ⁺
34	24	99 ⁺	99 ⁺
33	23	99	99 ⁺
32	22	99	99 ⁺
31	21	98	99 ⁺
30	20	97	99 ⁺
29	20	97	99
28	19	95	97
27	18	94	94
26	17	93	91
25	16	91	88
24	15	89	85
23	14	87	83
22	13	84	79
21	12	82	75
20	11	79	72
19	10	76	68
19	9	71	64
17	9	71	58

Table 4 (cont.)

"Elementary Algebra Skills"

Raw Score	Scaled Score	National Percentile*	General College Percentile
16	8	65	54
15	7	60	48
14	6	56	43
13	5	50	38
12	4	43	31
11	3	37	25
10	2	31	20
9	1	14	15
8	1	14	11
7	1	14	8
6	1	14	5
5	1	14	3
4	1	14	2
3	1	14	2
2	1	14	1
1	1	14	1

Raw Score GC Mean = 17.04

Raw Score GC Std Dev = 7.39

National Mean = 6.6 (scaled score)

National Mean \approx 15 (raw score)

* Data were gathered from 3,285 college students who had 1 or 2 semesters of algebra

Table 5

Student Classified by Placement Categories

Reading Comprehension

Level	Score	Recommended Course(s)	N	%
1	0-25	GC 1403	176	19
2	26-34	GC 1401, GC 1403, or GC 1407	385	42
3	26-38	GC 1401 or GC 1407, if needed	227	25
4	39-50	-----	122	13

Written English Expression

Level	Score	Recommended Course(s)	N	%
1	0-22	GC 1411	261	29
2	23-30	GC 1407, GC 1411, or GC 1412	498	55
3	31-34	GC 1421 or if desired, GC 1412	127	14
4	35-40	GC 1421	24	3

Table 5 (cont.)

Student Classified by Placement Categories

Mathematics (Placement was based on a combination of scores on whole numbers, arithmetic, real numbers, and algebra.)

Level	Recommended Course(s)	N	%
1	GC 1431	7	1
2	GC 1434	37	4
3	Decision Zone(GC 1434, 1435, or 1433)	440	48
4	GC 1435	71	8
5	Decision Zone(GC 1435 or 1433)	40	4
6	Decision Zone(GC 1435, 1445 or 1433)	218	24
7	GC 1445 or 1445	71	8
8	Decision Zone(GC 1445,1446 or Math 1111)	23	3

Table 6

Combinations of Developmental Courses needed

Reading (Levels 1 and 2)
 Writing (Levels 1 and 2)
 Mathematics (Levels 1 - 5)¹

	N	%
	<hr/>	
Reading, Writing and Mathematics	385	42
Reading and Writing	130	14
Reading or Writing and Mathematics	165	18
Reading or Writing	117	13
Mathematics	44	5
None needed	64	7

Total Number of Developmental Courses needed by Individual Students²

	N	%
	<hr/>	
Three courses	385	42
Two courses	295	32
One course	161	32
None	64	7

¹ Only arithmetic and elementary algebra are included

² Students may actually need more than one course in developmental math

Table 7

**First-year Academic Outcomes
Broken Down by Placement Categories**

Placement Categories	Mean GPA	Mean CCR
Students who needed:		
All three courses	2.17	.76
Two courses	2.38	.80
Reading and Writing	2.47	.84
Reading or Writing, and Math	2.31	.77
One course	2.38	.78
Reading or Writing	2.32	.78
Math	2.41	.77
None	2.41	.77

Table 8

Correlations Among Placement Scores

Reading				
Writing	.62*			
Arithmetic	.30*			
Algebra	.14*	.17*	.65*	
	Reading	Writing	Arithmetic	Algebra

*P ≤ .001

**Correlations between Placement Scores and
First-Year Academic Outcomes**

Cumulative Credits Completed	-.01	.02	.12*	.15*
Cumulative GPA	.06	.10	.15*	.11*
Cumulative CCR	-.03	.01	.08	.04
Number of Quarters Enrolled	-.08	-.05	.03	.09
	Reading	Writing	Arithmetic	Algebra

*P ≤ .001

References

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Morris, C. & Losak, J. (1986). The role of institutional research in evaluation of nontraditional programs: college preparatory analysis at Miami-Dade community College. In Jo Losak (Ed.), Applying Institutional Research in Decision Making. San Francisco: Jossey Bass Inc., 3-12.

Appendix

GC ENTRANCE ASSESSMENT PROGRAM: Information for Advisers FALL, 1986

General College has adopted new placement tests in mathematics and reading. For fall quarter, we will continue to use the Written English Expression Placement Test for writing placement, but we anticipate beginning to use a writing sample in place of that test, beginning winter quarter. On the next two pages, are guidelines for placing students in courses, based upon those test scores.

When you meet with your advisee, please check the results of the placement exams and make sure your advisee is taking advantage of the courses that he or she might need to be prepared for a University education.

Following is a list of the courses (with their descriptions) recommended in the placement guidelines, should you desire more information.

Reading and Writing Courses

GC 1401, Improving Reading Comprehension, Study Skills, and Vocabulary (1-3 cr). Budgeting time efficiently; previewing, reviewing, and studying textbooks; memorizing; taking notes; organizing material; and studying for tests. Identifying main ideas, retaining facts, and recognizing relationships of thoughts from their reading. Vocabulary building methods through use of basic word parts, words in context, and vocabulary of specific subject areas. Programmed and other self-help method, with periodic tutorial conferences and tests to measure progress and achievement. Target population: RC score, 26-38.

GC 1403, Reading Comprehension and Study Skills (3 cr). Skills work in concentration, memory, reading rate, comprehension, and evaluation and application of written information. Lab reading materials, computers, cassettes, videotapes, timed readings. Whole class, small group, and individualized instruction. Target population: RC score, 0-34.

GC 1407, Introduction to College Reading and Writing (5 cr). This course will help students develop an understanding of the relationship between reading and writing. Based on this recognition, students will be able to improve their reading comprehension and study skills, and their writing skills through individualized attention and small group work. The course is organized around four broad thematic groupings; developed to aid students' common learning interests and to acknowledge differences among individuals as well. Target population: RC score, 26-38; WEEPT score, 23-30.

GC 1411, Fundamentals of Usage and Style (3 cr). Students practice principles of grammar, usage, and style by doing exercises and writing sentences and paragraphs. Target population: WEEPT score, 0-30; RC score, 26-50.

GC 1412, Writing Grammatical Sentences and Developing Organized Paragraphs (1-2 cr). Work on sentence problems to develop style that is grammatically correct and structurally flexible and complex. Work on paragraph problems and practice various patterns for writing organized paragraphs. Target population: WEEPT score, 23-34.

GC 1421, Writing Laboratory: Personal Writing (4 cr). Students read and write descriptive narratives, characterizations, and autobiographical sketches. Personal help with individual writing problems. Emphasis on clear and effective written expression. Target population: WEEPT score, 31-40.

Mathematics Courses

GC 1431, Basic Mathematics I (3 cr). A self-paced course for students who have a limited knowledge in arithmetic. Topics include the four basic operations of addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals and elementary word problems using these skills. Offered through the Mathematics Learning & Assessment Center.

GC 1433, Basic Mathematics: Programmed Study (1-10 cr, consent of one of the following required to register: Donham, Gauguli, Garfield, Giese, Koch, Robertson). A programmed instruction course covering topics in arithmetic and elementary algebra. A diagnostic test will be given to determine what topics will be covered. With the help of tutors in the Mathematics Learning & Assessment Center, students work on prescribed material at their own pace from a textbook (there are no lectures). The course content includes topics covered in GC 1434 and GC 1435. Registration is for a maximum of 3 credits in any one quarter, but the course may be repeated for up to a total of ten credits. Prerequisite: ability to add, subtract, multiply, and divide whole numbers.

GC 1434, Mathematics Skills Review (4 cr). A lecture class covering the skills of arithmetic, including exponents, order of operations, averages, prime numbers, greatest common factor, least common multiple, fractions, decimals, ratio, proportion, percent, positive and negative numbers, roots of numbers, the metric system, and geometric formulas. Prerequisite: ability to add, subtract, multiply, and divide whole numbers.

GC 1435, Elementary Algebra (5 cr). A lecture class covering skills of beginning algebra, including, signed numbers, expressions, equations and inequalities, rational expressions, exponents and polynomials, factoring, Cartesian graphing, systems of equations, and radical expressions. Prerequisite: Ability to add, subtract, multiply, and divide whole numbers, fractions, and decimals; work word problems involving ratio, proportion, and percent.

GC 1439, Mathematics Review (3 cr per quarter; may be repeated up to a total of 9 cr). A programmed instruction class for students currently enrolled in a GC math class who need to review the material of that class before going on to the next math class. With the help of tutors in the Mathematics Learning & Assessment Center, students work on prescribed material at their own pace from a textbook (there are no lectures). The course content includes a review of topics covered in GC 1434, GC 1435, GC 1445, or GC 1446. Prerequisite: recommendation from current GC math teacher.
Note: Not based on GC Assessment Program results.

GC 1445, Intermediate Algebra (5 cr). This is a course intended for students who do not plan to take further math courses. Students who plan on taking Math 1111, College Algebra, should register for GC 1446, Pre-college Algebra. GC 1445 is a lecture class covering the skills of a second course in algebra, including intermediate topics in one and two variable, absolute value, rational, radical, and quadratic equations and inequalities, polynomials, factoring, rational expressions, complex numbers, functions, conic sections, systems of equations, exponential and logarithmic functions, sequences, and series. Prerequisite: ability to compute with signed numbers; solve equations and inequalities; and simplify rational expressions; work problems involving exponents, polynomials, factoring, Cartesian graphing, and radical expressions.

GC 1446, Pre-college Algebra (5 cr). This course is intended for students who plan to take further math courses. The content is the same as for GC 1445, but the pace is faster and the topics are covered in more depth. Prerequisite: Same as for GC 1445, but students should have received a grade of A or B in elementary algebra in the recent past.

GC ENTRANCE ASSESSMENT PROGRAM: Placement Guidelines
FALL, 1986

READING COMPREHENSION (Raw Score)

RC SCORE	RECOMMENDED PLACEMENT
0 - 25	Strongly recommend GC 1403.
26 - 34	Strongly recommend GC 1401, GC 1403, or GC 1407 (if Writing score is 23-30).
35 - 38	Recommend GC 1401 or GC 1407, if needed.
39 - 50	Student probably doesn't need to enroll in a reading course. Suggest using the Reading & Writing Center (Nich 1) as a resource

WRITTEN ENGLISH EXPRESSION (Raw Score)

WEEPT SCORE	RECOMMENDED PLACEMENT
0 - 22	Strongly recommend GC 1411 (if Reading score is 0-25, student should not take GC 1411 until completing GC 1403--see above recommendation for Reading).
23 - 30	Recommend GC 1407, GC 1411, or GC 1412.
31 - 34	Recommend GC 1421 or, if the student desires additional preparation, GC 1412. In either case, suggest using the Reading & Writing Center (Nich 1) as a resource.
35 - 40	Strongly recommend GC 1421, with use of the Reading & Writing Center (Nich 1) as a resource.

GC ENTRANCE ASSESSMENT PROGRAM: Placement Guidelines
FALL, 1986

MATHEMATICS PLACEMENT TESTS

WHOLE NUMBERS SCORE	ARITHMETIC TOTAL	REAL NUMBERS SCORE	ALGEBRA TOTAL	RECOMMENDATION
0-4	0-15	NA	NA	GC 1431, 3 cr.
0-4	16-27	NA	NA	GC 1434
0-4	28-30	0-3	NA	<u>Decision Zone 1</u> (GC 1434, 1435, or 1433-3)
0-4	28-30	4-9	0-16	GC 1435
			17-35	<u>Decision Zone 2</u> (GC 1435, 1445, or 1433-3)
5-9	0-15	NA	NA	GC 1434
5-9	16-27	NA	NA	<u>Decision Zone 3</u> (GC 1434, 1435, 1433-3)
5-9	28-35	0-3	NA	<u>Decision Zone 4</u> (GC 1435 or 1433-3)
5-9	28-35	4-9	0-16	GC 1435
5-9	28-35	4-9	17-27	<u>Decision Zone 5</u> GC 1435, 1445, 1433-3)
5-9	28-35	4-9	28-32	GC 1445 or 1446
5-9	28-35	4-9	33-35	<u>Decision Zone 6</u> (GC 1445, 1446, or Math 1111; further testing in intermediate algebra)

Note: Each Decision Zone indicates different possible recommendations. Students should discuss their previous math coursework, their preference for self-paced or lecture courses, and the areas in which they feel a need to improve. One option is GC 1433-3, a one-quarter course which will provide further diagnosis and individualized units of prescribed instruction.

Students who prefer to work at their own pace may choose to enroll in GC 1433-1 or 2 instead of 1434 or 1435. These students will need permission of a GC Math faculty member.